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Physical Geography (General Principles) :

(I) Origin and evolution of earth, interior of earth, Wegner's Continental Drift Theory; Plate tectonics.Volcanoes, Earthquakes and Tsunamis
(ii)Major types of rocks and their characteristics, evolution and characteristics of landforms in the Fluvial, Glacial, Arid and Karst regions
(iii) Geomorphic processes; Weathering, mass wasting, erosion and deposition,soil formation,Landscape cycles, ideas of Davis and Penck
(iv)Composition, Structure and Stratification of the atmosphere
(v) Insolation,heat budget of the earth.
(vi) Horizontal and vertical distribution of temperature, inversion of temperature.
(vii) Air masses and fronts. Tropical and temperate cyclones.
(viii) Evaporation and Condensation: dew, frost, fog, mist and cloud, rainfall types.
(ix)Classification of climates, (Koppen and Thornthwaite), Greenhouse effect, global warming and climatic changes
(x) Hydrological cycle, distribution of temperature and solicits in the oceans and seas, waves,tides and currents, ocean floor relief features,

Physical and Human Geography of India

(xi) Structure, relief and physiographic divisions.Drainage Systems Himalayan and the Peninsular.
(xii)Indian monsoon, mechanism, onset and retreat, climatic types (Koppen and Trcwartha).Green Revolution and its impact on major crops of India. Food scarcity
(xlll) Natural Vegetation-Forest types and distribution, wild life, conservation, biosphere reserves.
(xiv)Major types of Soils.(ICAR classification) and their distribution. Soil degradation and conservation
(xv) Natural Hazards : Floods, Droughts, Cyclones, Landslides,
(xvi) Population growth, distribution and density
(xvii)Age: Sex, ratio, rural-urban composition;
(xviii)Population, environment and development
(xix)Types of Settlements : rural and urban. Urban morphology; functional classification of urban settlements Problems of human settlement in India.
(C) Natural Resources of India; Development and Utilization Land Resources ie General land use, agricultural land use,
(xx) geographical condition and distribution of major crops, like,Rice, Wheat,Cotton, Jute, Sugarcane, Rubber, Tea and Coffee,
(xxi) Water Resources : Availability and utilization for industrial and other purposes, irrigation, scarcity of water, methods of conservation-rain water harvesting and watershed management, ground water management.

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(xxii)Minerals and Energy Resources : Distribution and utility of [a] metallic minerals (ion ore, copper, bauxite, manganese), (b) non- metallic and conventional minerals [coal,petroleum and natural gas), (c) hydro electricity and non conventional sources of energy (Solar, Wind, bio-gas),(d) energy sources Their distribution and conservation.
(xxiii) Development of Industries : Types of Industries;factors of industrial location, distribution and changing pattern of selected industries [iron and steel, cotton textile, sugar and petro- chemicals); Weber's theory of industrial location-Its relevance in the modern world.
(xxiv) Transport, Communication and International Trade : Roads, railways and water ways. Bases of International trade, changing pattern of India's ' foreign trade.

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Origin and evolution of earth

Beginning of the Universe started about 13.6 billion years ago,when the Big Bang created the universe from a point source.
During this process, light elements, like H, He, Li, B, and Be formed. From this point in time, the universe began to expand and has been expanding ever since.
Concentrations of gas and dust within the universe eventually became galaxies consisting of millions of stars.
Within the larger stars, nuclear fusion processes eventually created heavier elements, like C, Si, Ca, Mg, K, and Fe.
Stars eventually collapse and explode during an event called a supernova.
During a supernova, heavier elements, from Fe to U, are formed. (See figure 1.9 in your text).
Throughout galaxies clusters of gas attracted by gravity start to rotate and accrete to form stars and solar systems.
For our solar system this occurred about 4.6 billion years ago.
The ball at the center grows dense and hot, eventually nuclear fusion reactions start and a star is born (in our case, the sun).
Rings of gas and dust orbiting around the sun eventually condenses into small particles. These particles are attracted to one another and larger bodies called planetismals begin to form.
Planetesimals accumulate into a larger mass. An irregularly-shaped proto-Earth develops.
The interior heats and becomes soft.
Gravity shapes the Earth into a sphere.
The interior differentiates into a nickel-iron core, and a stony (silicate) mantle.
Soon, a small planetoid collides with Earth. Debris forms a ring around the Earth.The debris coalesces and forms the Moon.
The atmosphere develops from volcanic gases. When the Earth becomes cool enough, moisture condenses and accumulates, and the oceans are born.



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Interior of earth,

Most of the knowledge we have about Earth's deep interior comes from the fact that seismic waves penetrate the Earth and are recorded on the other side. Earthquake ray paths and arrival times are more complex than illustrated in the animations, because velocity in the Earth does not simply increase with depth. Velocities generally increase downward, according to Snell's Law, bending rays away from the vertical between layers on their downward journey; velocity generally decreases upward in layers, so that rays bend toward the vertical as they travel out of the Earth . Snell's Law also dictates that rays bend abruptly inward at the mantle/outercore boundary (sharp velocity decrease in the liquid) and outward at the outer core/inner core boundary (sharp velocity increase).

Major Points to remember about P S and Love waves

- **P wave** or **primary wave**. This is the fastest kind of seismic wave, and, consequently, the first to 'arrive' at a seismic station.
- The P wave can move through solid rock and fluids, like water or the liquid layers of the earth.
- P waves are also known as **compressional waves.**
- **S wave**or **secondary wave**, which is the second wave you feel in an earthquake. An S wave is slower than a P wave and can only move through solid rock, not through any liquid medium.
- Travelling only through the crust, **surface waves**are of a lower frequency than body waves, and are easily distinguished on a seismogram as a result.

Earth's Layers – Earth's Composition

The Crust of Earth

It is the outermost and the thinnest layer of the earth's surface, about 8 to 40 km thick. The crust varies greatly in thickness and composition – as small as 5 km thick in some places beneath the oceans, while under some mountain ranges it extends up to 70 km in depth.

The crust is made up of two layers an upper lighter layer called the Sial (Silicate + Aluminium) and a lower density layer called Sima (Silicate + Magnesium).The average density of this layer is 3 gm/cc.

The Mantle of Earth

This layer extends up to a depth of 2900 km.

Mantle is made up of 2 parts: Upper Mantle or Asthenosphere (up to about 500 km) and Lower Mantle. Asthenosphere is in a semimolten plastic state, and it is thought that this enables the lithosphere to move about it. Within the asthenosphere, the velocity

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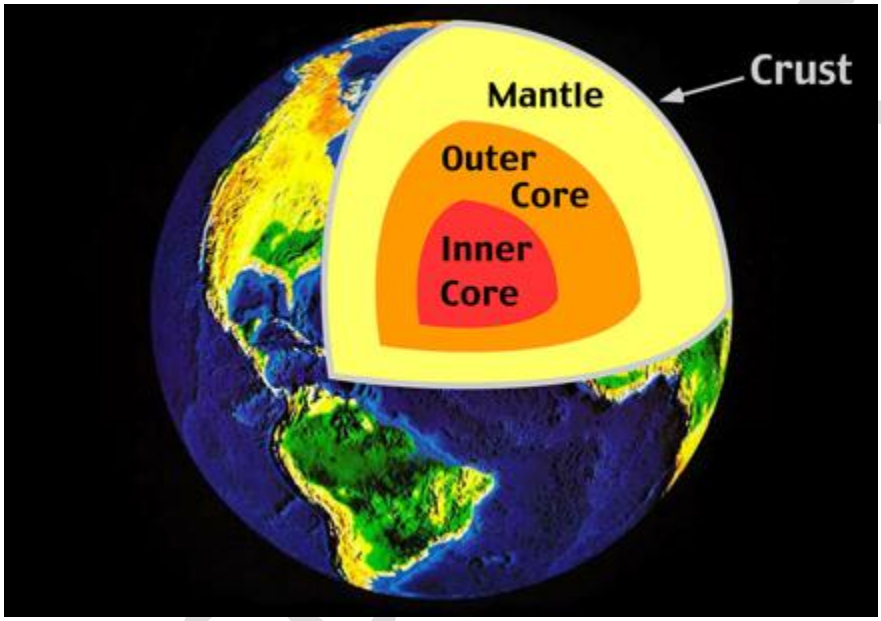
of seismic waves is considerably reduced (Called 'Low Velocity

The line of separation between the mantle and the crust is known as Mohoviricic Discontinuity.

The Core of Earth

Beyond a depth of 2900 km lies the core of the earth.The outer core is 2100 km thick and is in molten form due to excessive heat out there. Inner core is 1370 km thick and is in plasticform due to the combined factors of excessive heat and pressure. It is made up of iron and nickel (Nife) and is responsible for earth's magnetism. This layer has the maximum specific gravity.The temperatures in the earth's core lie between 2200°c and 2750°c. The line of separation between the mantle and the core is called GutenbergWiechert Discontinuity.



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