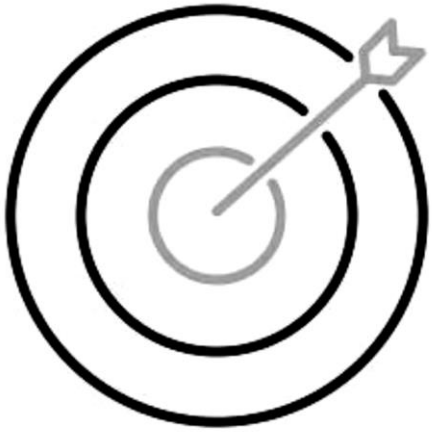
MALAPPURAM GEOGRAPHICAL SOCIETY
2020-21



FOCUS AREA-'21

GEOGRAPHY
STUDY MATERIAL FOR PLUS ONE HIGHER SECONDARY EXAMINATION

(PLUS ONE)SEPTEMBER'21

PREFACE

The Malappuram Geographical Society has played a major role in energizing the learning process of students and in making geography simple and enjoyable in the crises caused by covid 19. The Malappuram Geographical Society is once again setting a model with another academic activity. There is no doubt that **"Focus' 21"** will be very useful for students as it contain notes and questions based on the Focus area topics on Plus One Geography. We hope "Focus'21" will reach out to students and give them the energy to excel.

Warm Greetings…..

President

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GEOGRAPHY

(PLUS ONE)

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MALAPPURAM GEOGRAPHICAL SOCIETY

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PART I

FUNDAMENTALS OF PHYSICAL GEOGRAPHY

CHAPTER 1

GEOGRAPHY AS A DISCIPLINE

- The term geography was first coined by **Eratosthenes**, a Greek scholar (276-194 BC)

- The word geography derived from Greek language **Geo (earth)** and **Graphos (description)**
- Put together, they mean **description of the earth** or **"the description of the earth as the abode of human beings"**

Definition

- Geography is concerned with the **description and explanation of the areal differentiation of the earth's surface**- **Richard Hartshorne**

- Geography studies **the differences of phenomena usually related in different parts of the earth's surface**- **Hettner**

- ✓ Geography deal with three sets of questions**: What? Where? Why?**

- **What? Identification** of the patterns of natural and cultural features as found over the surface of the earth
- **Where? Distribution** of the natural and human/cultural features over the surface of the earth
- **Why? Explanation or the causal relationships** between features and the processes and phenomena

GEOGRAPHY AS AN INTEGRATING DISCIPLINE

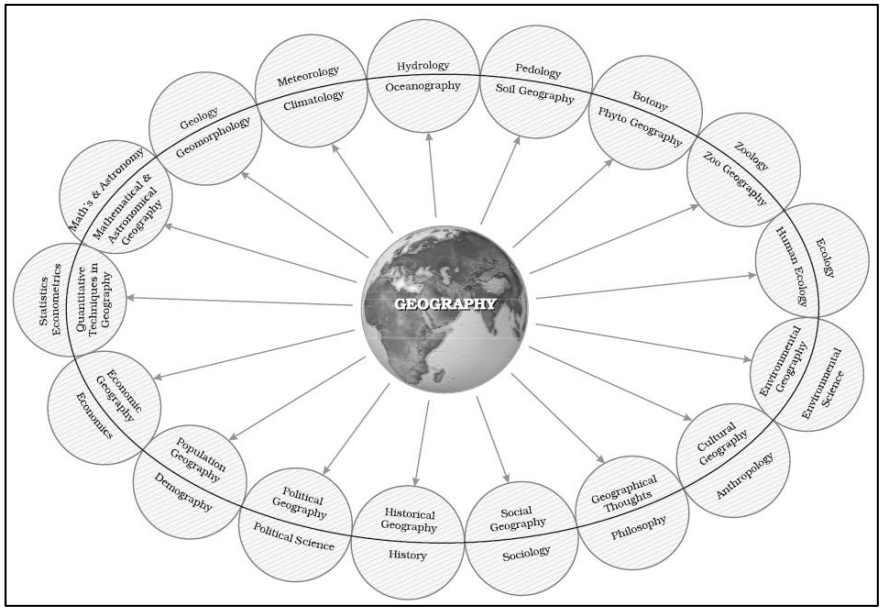
- Geography is a **discipline of synthesis**
- **Holistic** in nature

Physical Geography and Natural Sciences

- The physical geography is **linked with geology, meteorology, hydrology and Pedology**, and thus**, geomorphology, climatology, oceanography and soil geography**
- Bio-Geography is related to botany, zoology and ecology
- For drawing maps proficiency in mathematics and art is needed

Geography and Social Sciences

- All the social science disciplines like **sociology, political science, economics and demography** linked with branches of geography like **social, political, economic and population and settlement**



BRANCHES OF GEOGRAPHY OR APPROACHES OF GEOGRAPHY

Systematic or General Geography

- Introduced by **Alexander Von Humboldt**, a German geographer (1769-1859)
- **A phenomenon is studied world over as a whole, and then the identification of typologies or spatial patterns is done**
- Example: Natural Vegetation

Regional Geography

- Developed by **Karl Ritter** (1779-1859), a German geographer
- **The world is divided into regions at different hierarchical levels** and **then all the geographical phenomena in a particular region are studied**
- Example: Natural, Political region

BRANCHES OF GEOGRAPHY (BASED ON SYSTEMATIC APPROACH)

- **PHYSICAL GEOGRAPHY**-Geomorphology, Climatology, Hydrology, Soil geography
- **HUMAN GEOGRAPHY** -Social/Cultural Geography, Population and Settlement Geography, Economic Geography Historical Geography Political Geography
- **BIO GEOGRAPHY**- Plant Geography, Zoo Geography, Ecology /Ecosystem, Environmental Geography

Physical Geography

- **Geomorphology** is devoted to the **study of landforms, their evolution and related processes**
- **Climatology** is the study of **structure of atmosphere and elements of weather and climates and climatic types and regions**
- **Hydrology** studies the **realm of water** over the surface of the earth including oceans, lakes, rivers and other water bodies and its effect on different life forms including human life and their activities
- **Soil Geography** is devoted to study the processes of **soil formation, soil types, their fertility status, distribution and use**

Human Geography

- **Social/Cultural Geography** encompasses the study of **society and its spatial dynamics** as well as the **cultural elements contributed by the society**
- **Population and Settlement Geography** (Rural and Urban). It studies **population growth, distribution, density, sex ratio, migration and occupational structure etc**
  - **Settlement geography** studies the characteristics of **rural and urban settlements**
- **Economic Geography** studies **economic activities of the people** including agriculture, industry, tourism, trade, and transport, infrastructure and services, etc.
- **Historical Geography** studies the historical processes through which the space gets organised. Every region has undergone some historical experiences before attaining the present day status
- **Political Geography** political events and studies boundaries, space relations between neighbouring political units, delimitation of constituencies, election scenario and develops theoretical framework to understand the political behaviour of the population

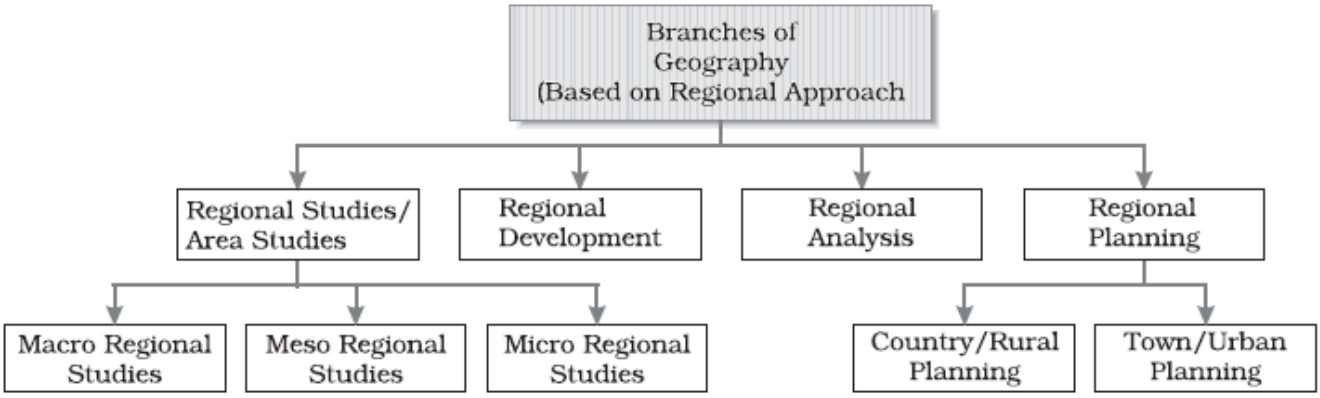
Biogeography

- The **interface between physical geography and human geography**

- **Plant Geography** studies the spatial pattern of **natural vegetation in their habitats**
- **Zoo Geography** studies the spatial patterns and geographic characteristics of **animals and their habitats**
- **Ecology /Ecosystem** deals with the **scientific study of the habitats characteristic of species**
- **Environmental Geography** studies the **realisation of environmental problems** such as land gradation, pollution and concerns for conservation

BRANCHES OF GEOGRAPHY BASED ON REGIONAL APPROACH

- **Regional Studies/Area Studies-** Macro, Meso and Micro Regional Studies
- **Regional Planning-** Country/Rural and Town/ Urban Planning
- **Regional Development**
- **Regional Analysis**



Philosophy

- Geographical Thought
- Land and Human Interaction/ Human Ecology

Methods and Techniques

- Cartography including Computer Cartography
- Quantitative Techniques/Statistical Techniques
- Field Survey Methods
- Geo-informatics comprising techniques such as Remote Sensing, GIS, GPS, etc**.**

PHYSICAL GEOGRAPHY AND ITS IMPORTANCE

- Physical geography includes the study of **lithosphere, atmosphere, hydrosphere and biosphere**
- **Lithosphere**: landforms, drainage, relief and physiography
- **Atmosphere**: composition, structure, elements and controls of weather and climate; temperature, pressure, winds, precipitation, climatic types, etc
- **Hydrosphere** oceans, seas, lakes and associated features with water realm
- **Biosphere** life forms including human being and macro-organism and their sustaining mechanism, viz. food chain, ecological parameters and ecological balance

EXERCISES

1. **Name the scholar who coined the term 'Geography'?**
   Ans ……
2. **The questions related to cause-effect relationship?**
   Ans ……
3. **The branch of geography that deals with the study of map making**
   Ans ……..
4. **Name the two major approaches in Geography**
   (a)……
   (b)……
5. **The questions related to the identification of the patterns of natural and cultural feature found over the surface of the earth**
   Ans…….....
6. **Make correct pairs from the following two columns and mark the correct option**

1. Meteorology	**A. Population Geography**
2. Demography	**B. Soil Geography**
3. Sociology	**C. Climatology**
4. Pedology	**D. Social Geography**

1……A…….

2……B…….

3……C…….

4……...D…….

7. Which geographer is associated with regional approach?

……..

8. The scholar associated with systematic Geography

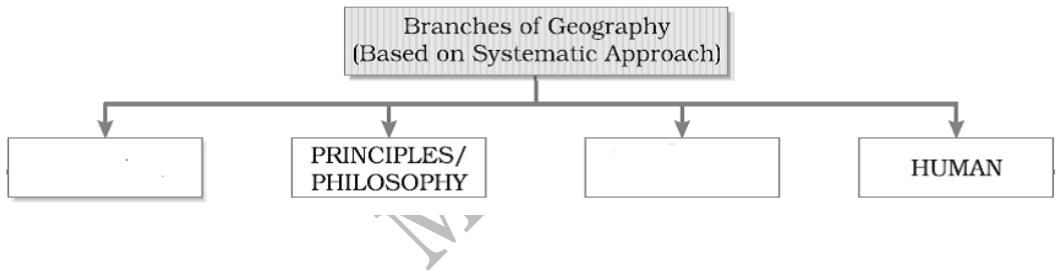
……..

9. A phenomenon is studied world over as a whole, and then the identification of typologies or spatial patterns is done. This approach in geography is termed as

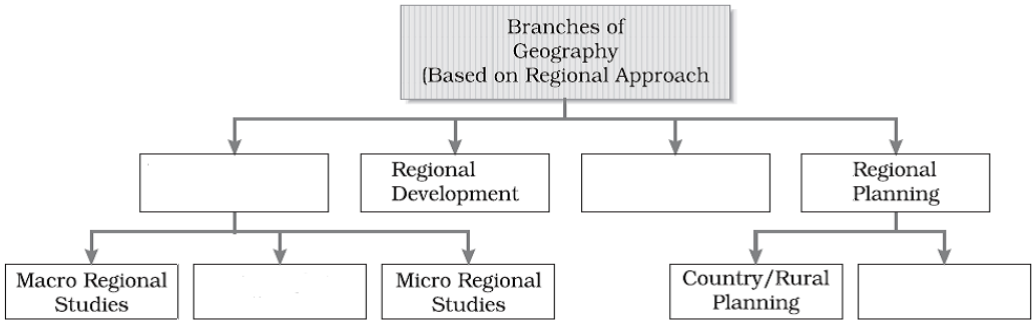
……

10. Complete the following chart

(a)



(b)



11. Certain branches of geography are given below in the brackets. Categorize them under the three major heads given in the table

(Population geography, Climatology, Environmental geography, Economic geography)

Physical Geography	Human Geography	Bio Geography
❖ ……	❖ …… ❖ ……	❖ ……

C H A P T E R 3

INTERIOR OF THE EARTH

❖ **Radius of the Earth : 6,370 km**

SOURCES OF INFORMATION ABOUT THE INTERIOR

- ❖ Most of our knowledge about the interior of the earth is largely based on estimates and inferences

Direct Sources

- ❖ **Mining**
- ❖ **Major projects -"Deep Ocean Drilling Project"** and **"Integrated Ocean Drilling Project"**
- ➢ **The deepest drill at Kola, in Arctic Ocean**
- ❖ **Volcanic eruption** when the molten material (magma) is thrown onto the surface of the earth, during volcanic eruption it becomes available for laboratory analysis

Indirect Sources

- ❖ **Analysis of properties of matter**
- ❖ **Meteors**
- ❖ **Gravitation**
- ❖ **Magnetic field**
- ❖ **Seismic activity**
- ➢ The gravitation force (*g*) is not the same at different latitudes on the surface. **It is greater near the poles and less at the equator**
- ➢ This is because of the **distance from the centre at the equator being greater than that at the poles**
- ❖ **Gravity Anomaly** The reading of the gravity at different places is differ from the expected values. Such a difference is called **gravity anomaly**

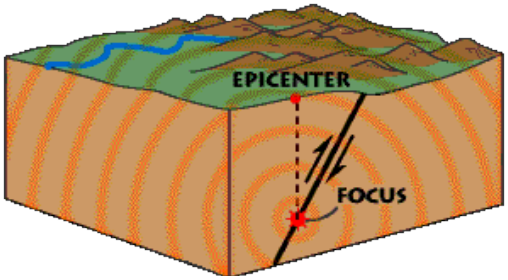
Earthquake

- ❖ **Shaking of the earth**
- ❖ It is a natural event
- ❖ It is **caused due to release of energy**, which generates waves that travel in all directions

Why does the earth shake?

- ❖ The release of energy occurs along a fault
- ❖ **A fault is a sharp break in the crustal rocks**
- ❖ Rocks along a fault tend to move in opposite Directions
- ❖ This causes a release of energy, and the energy waves travel in all directions

- **Focus or Hypocenter**: The point where the energy is released
- **Epicenter**: The point on the surface, nearest to the focus
  - It is the first one to experience the waves
  - **It is a point directly above the focus**



Earthquake Waves

- All natural earthquakes take place in the Lithosphere
- **Seismograph**: An instrument records the waves reaching the Surface

Types of Earthquake Waves

- Earthquake waves are basically of two types — **Body waves and Surface waves**
- **Body waves are generated due to the release of energy at the focus** and move in all directions **travelling through the body of the earth**
- **Surface Waves**: **The body waves interact with the surface rocks** and generate new set of waves called surface waves. These **waves move along the surface**
- The **surface waves are the last to report on seismograph**
- These waves are **more destructive**
- They cause displacement of rocks, and hence, the collapse of structures occurs

TYPES OF BODY WAVES

- **P Waves or Primary Waves**
- **S Waves or Secondary Waves**

P Waves	S Waves
❖ P-waves **move faster and are the first to arrive at the surface** ❖ Similar to **Sound Waves** ❖ They travel through **gaseous, liquid and solid materials**	❖ S-waves arrive at the surface with some time lag ❖ They can travel only **through solid materials** ❖ It helped scientists to **understand the structure of the interior of the earth**

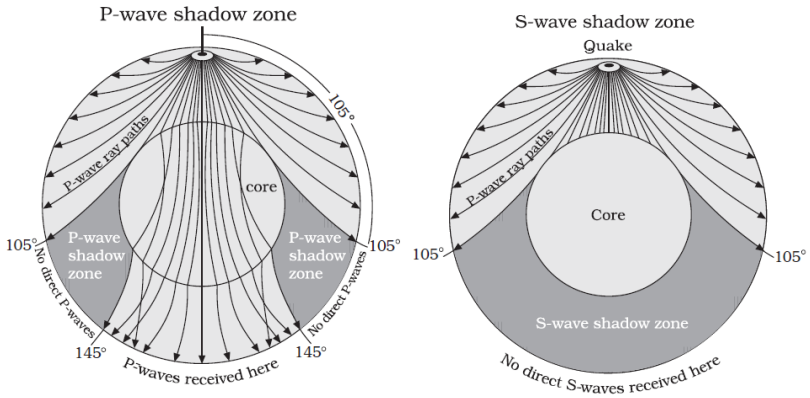
Propagation of Earthquake Waves

- P-waves **vibrate parallel** to the direction of the wave
- It creates density differences in the material leading to stretching and squeezing of the material

- Other three waves **vibrate perpendicular** to the direction of propagation
- They create troughs and crests in the material

Emergence of Shadow Zone

- some **specific areas where the waves are not reported**
- Shadow Zone of P and S Wave- 105^0 to 145^0
- **Shadow Zone of S Wave- Beyond 105^0**
- **Shadow Zone of P Wave- 105^0 to 145^0**



Types of Earthquakes

Tectonic Earthquake

- The most common type
- These are **generated due to sliding of rocks along a fault plane**

Volcanic Earthquake

- Confined to **areas of active volcanoes**

Collapse Earthquake

- Areas of **intense mining activity**
- the roofs of underground mines collapse causing minor tremors

Explosion Earthquake

- occur due to the **explosion of chemical or nuclear devices**

Reservoir Induced Earthquake

- occur in the **areas of large reservoirs**

Measuring Earthquakes

- **Earthquakes are measured according to**
  - **Magnitude**
  - **Intensity**

Magnitude

- **The magnitude means the energy released during the quake**
- **Magnitude scale is Richter Scale**
- **Expressed in absolute numbers 0 -10**

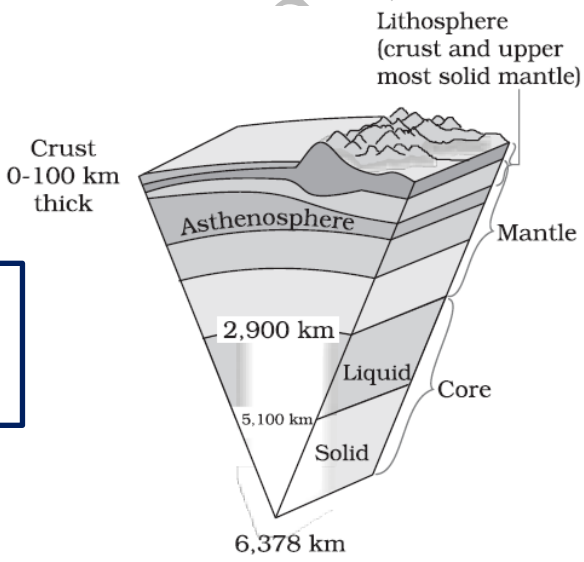
Intensity

- **Intensity means the visible damage caused by the event**
- **Intensity scale** is **Mercalli scale**
- **The intensity scale is from 1-12**

Effects of Earthquake

- Ground Shaking
- Differential ground settlement
- Land and mud slides
- Soil liquefaction
- Ground lurching
- Avalanches
- Ground displacement
- Floods from dam and levee failures
- Fires
- Structural collapse
- Falling objects
- Tsunami

Structure of the Earth



- **THE CRUST**
- **THE MANTLE**
- **THE CORE**

The Crust

- It is the **outermost solid part of the earth**
- It is **brittle in nature**
- Oceanic crust is thinner as compared to the continental crust
- The mean thickness of oceanic crust is 5 km whereas that of the continental is around 30 km
- Density of oceanic Crust: 2.7 g/cm3
- Continental Crust is made up of heavier rocks having density of 3 g/cm3
- The **rock found in the oceanic crust is basalt**

The Mantle

- The portion of the interior beyond the Crust
- **The boundary separating Crust from Mantle**: **Mohorovicic Discontinuity**
- The mantle extends from Moho's discontinuity to a depth of 2,900 km
- The **upper portion of the mantle** is called **asthenosphere**
- Density higher than the crust's (3.4 g/cm3)
- The lower mantle extends beyond the asthenosphere is in solid state

Asthenosphere

- The word **astheno** means **weak**
- It extend up to 400 km
- It is the **main source of magma**

The Core

- **Inner most layer**
- The core is made up of very heavy material
- Referred as **NIFE layer (Nickel + Iron)**
- The outer core is in liquid state and density is 5 g/cm^3
- The inner core is in solid state and **density is 13 g/cm^3**

Volcano

- Volcano is a **place where gases, ashes and lava escape to the ground**
- Active volcano means **the gases, ashes and lava released out in the recent past**

Magma and Lava

- **The material in the upper mantle portion is called Magma**
- **Once it reaches the surface called as Lava**

Volcanic Materials

- The material that reaches the ground **– lava, pyroclastic debris, bombs, ash, dust and gases (nitrogen, hydrogen, argon, chlorine, Sulphur etc.)**

TYPES OF VOLCANOES

- On the basis of **nature of eruption and the form developed at the surface**
  - **Shield Volcanoes**
  - **Composite Volcanoes**
  - **Caldera**
  - **Flood Basalt Provinces**
  - **Mid - Ocean Ridge Volcanoes**

Shield Volcanoes

- The shield volcanoes are the **largest of all the volcanoes**
- These are **mostly made up of Basalt**
- They became explosive if somehow water gets in to the vent
- The upcoming lava moves in the form of a fountain and **develops in to cinder cone**
- The **Hawaiian volcanoes** are the most famous examples
- These volcanoes are not steep

Composite Volcanoes

- These are characterised by **eruptions of cooler and more viscous lavas than basalt**
- Along with lava, large quantities of pyroclastic material and ashes find their way to the ground
- This leads to the **formation of layers** at the vent

Caldera

- These are the **most explosive volcanoes**
- When they erupt they tend to collapse on themselves rather than building any tall structure
- The **collapsed depressions are called Calderas**

Flood Basalt provinces

- These volcanoes **outpour highly fluid lava that flows for long distances**
- Covered by 1000 sq.km of thick basalt lava flows
- thickness of more than 50 m
- Example: **Deccan traps**

Mid–Ocean Ridge Volcanoes

- These **volcanoes occur in the oceanic areas**
- The central portion of ridge experiences frequent eruptions

VOLCANIC LANDFORMS

- **Depending on the location of cooling of the lava** Igneous rocks are classified as
  - **Volcanic Rocks**- **cooling at the surface**
  - **Plutonic Rocks**- **cooling in the crust**
- The lava that cools within the crustal portions assumes different forms and are known as **Intrusive forms**

Intrusive Volcanic Land Forms

❖ **Batholiths** **Laccolith** **Lapolith** **Phacolith** **Sill and Sheet** **Dyke**

Batholiths

- ❖ A **large body of magnetic material that cools deeper depth in the form of large domes**
- ❖ **They cover large areas**
- ❖ These are **granitic bodies**
- ❖ Batholiths are the cooled portion of magma chambers

Laccoliths

- ❖ These are **dome-shaped rocks with a level base and connected by a pipe-like conduit from below**
- ❖ Examples: Karnataka plateau

Lapolith

- ❖ **Saucer shape concave to the sky body** are called Lapolith

Phacolith

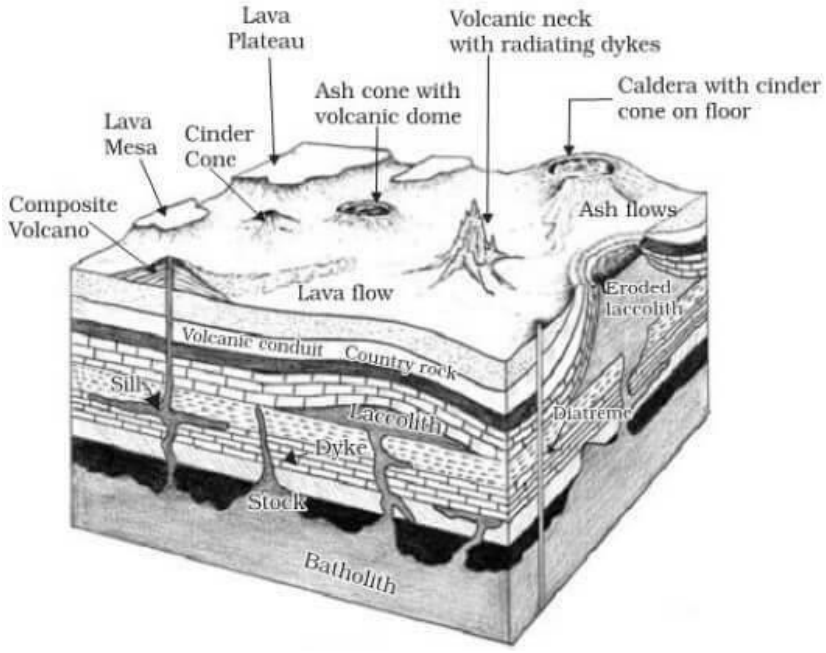
- ❖ **A wavy mass of intrusive rocks is found at the base of Synclines or at the top of Anticlines**

Sill and Sheet

- ❖ The near **horizontal bodies of the intrusive rocks** are called sill or sheet
- ❖ The **thick horizontal deposits are called Sills**
- ❖ The **thinner ones are called Sheets**

DYKES

- ❖ **Perpendicular to the ground**
- ❖ **Wall-like structure**



EXERCISES

1. Name the earthquake waves which is more destructive

   Ans:…….

2. Which one of the following is a direct source of information about the interior of the earth?

(a) Earthquake waves (b) Volcanoes (c) Gravitational force (d) Earth magnetism

Ans: ……....

3. Which type of volcanic eruptions have caused Deccan Trap formations?

   (a) Shield (b) Flood (c) Composite (d) Caldera

   Ans:……

4. Which one of the following describes the lithosphere?

   (a) Upper and lower mantle (b) crust and upper mantle (c) crust and core

   (d) Mantle and core

Ans……

5. The boundary between the earth's crust and mantle

   (a) Gutenberg discontinuity (b) Mohorovicic discontinuity (c) Tropopause (d) Mesopause

   Ans……

6. A large body of magnetic material that cools deeper depth in the form of a large domes

   (a)Lapolith (b) Phacolith (c) Batholith (d) Sill

   Ans……

7. Shadow zone of P wave

   (a) Beyond 105^0 (b)Between 105^0 and 145^0 (c) Beyond 145^0 (d) None of the Above

   Ans……

8. The largest of all volcano on earth

   (a) Caldera (b) Composite Volcano (c) Shield Volcano (d) Flood basalt provinces

   Ans……..

9. The intensity of earthquake is measured in

   (a) Richter Scale (b) Mercalli Scale (c)seismograph (d) measuring scale

   Ans……

10. The magnitude of earthquake is measured in

    (a) Seismograph (b) Mercalli Scale (c) Richter Scale (d) None of the Above

    Ans…….

11. The most common type of earthquake

    (a) Volcanic (b) Collapse (c) Tectonic (d) Explosion

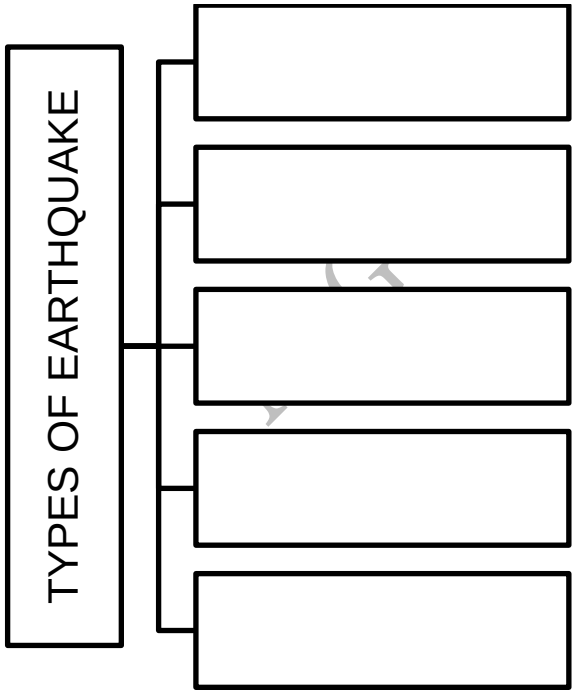
    Ans……...

12. Differentiate between Focus and Epicentre
13. What are the direct source of information about the earth's interior
14. What are body waves? Mention different types of Body waves.
15. Define NIFE

16. What are the major scientific project that provides information about earth's interior.
17. There are two types of sources of information about the interior of earth. Name them.

Direct Source	Indirect Source
❖ …… ❖ …….. ❖ ……... ❖ ……	❖ …… ❖ …… ❖ …….... ❖ ……..

18. Identify the most explosive type of volcano in the world. Explain any two other type of volcano
19. What do you understand by intrusive volcanic landforms? Briefly describe various intrusive volcanic landforms
20. Explain the structure of earth with the help of diagram
21. There are different types of earthquake. Name them



22. What do you understand by intrusive forms? Briefly describe various intrusive forms

CHAPTER 4

DISTRIBUTION OF OCEANS AND CONTINENTS

- Who was the first to consider the possibility of Europe, Africa and America having been located side by side

  Abraham Ortelius, Dutch Map maker proposed such a possibility in 1596

- Who drew a map showing the three continents (Europe, Africa and America) together?

  Antonio Pellegrini

THEORIES ABOUT THE DISTRIBUTION OF OCEANS AND CONTINENTS

CONTINENTAL DRIFT

- The theory of Continental Drift was put forwarded by **Alfred Wegener**—a German meteorologist in 1912
- This was **regarding the distribution of the oceans and the continents**
- According to Wegener, **all the continents formed a single continental mass and Mega Ocean surrounded the same**
- The super continent was named **PANGAEA**, which meant **all earth**
- The mega-ocean was called **PANTHALASSA**, meaning **all water**
- He argued that, **around 200 million years ago, the super continent, Pangaea, began to split**
- Pangaea first broke into two large continental masses as **Laurasia** and **Gondwanaland**
- Laurasia is the Northern continent and Gondwanaland is the Southern continent respectively
- Later **Laurasia and Gondwanaland continued to break into various smaller continents** that exist today
- **Laurasia break into North America, Eurasia, Greenland and Arctic region**
- **Gondwanaland break into South America, Africa, Indian Subcontinent, Australia and Antarctic region**.

Evidence in Support of the Continental Drift

- **The Matching of the continents (Jig-Saw-Fit)**
- **Rocks of the Same Age across the oceans**
- **Tillite**
- **Placer Deposits**
- **Distribution of Fossils**

The Matching of Continents (Jig-Saw-Fit)

- The **shorelines of Africa and South America** facing each other have a remarkable and Unmistakable match.
- A map produced using a computer programme by **Bullard** in 1964 shows the Atlantic margins are perfectly matched.

Rocks of Same Age across the Oceans

- The radiometric dating methods developed in the recent period helped to correlate the rock formation from different continents
- The belt of ancient rocks of 2,000 million years from Brazil coast matches with those from western Africa. It is formed during Jurassic Age.

Tillite

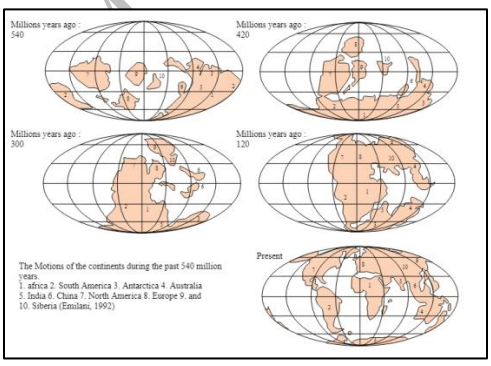
- **Tillite is sedimentary rock formed out of deposits of glaciers**.
- These Gondawana systems of sediments are found in India, Africa, Falkland Island, Madagascar, Antarctica and Australia.
- The glacial tillite provides evidence of paleoclimates and also of drifting of continents

Placer Deposits

- The occurrence of rich placer deposits of gold in the Ghana coast and the absolute absence of source rock in the region
- Gold deposits of the Ghana are derived from the Brazil plateau when the two continents lay side by side.

Distribution of Fossils

- Identical species of plants and animals living on land or in fresh water on either side of the marine barriers
- The fossils of **Lemurs occur in India, Madagascar and Africa**
- **Mesosaurus** of Southern Cape province of South Africa and Iraver formations of Brazil.



Force for Drifting

- **Pole-fleeing force:- caused due to the rotation of the earth**
- **Tidal force: - is due to the attraction of sun and moon that develops tides in oceanic water**

POST DRIFT STUDIES

Convectional Current Theory

- Put forwarded by **Arthur Holmes** in 1930s
- He argues the possibility of convection currents operating in the mantle portion
- **These currents are generated due to radioactive elements (Uranium and Thorium) causing thermal differences in the mantle portion**
- Due to this currents the continents are moving
- **provides an explanation to the issue of force for continental drift theory by Wegner**

PLATE TECTONICS THEORY

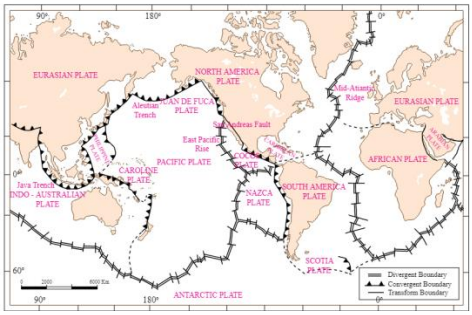
- ❖ This concept put forth in 1967 by **McKenzie, Parker and Morgan**
- ❖ **A tectonic plate or Lithospheric plate is a massive, irregularly-shaped slab of solid rock composed of both continental and oceanic area**
- ❖ Plate may be Continental and oceanic depending on which of the two occupy a larger portion of the plate
- ❖ **Pacific plate is largely an oceanic plate whereas the Eurasian plate may be called a continental plate**
- ❖ **Plates move horizontally over the Asthenosphere**
- ➢ The theory of plate tectonics proposes that the earth's lithosphere is divided into seven major and some minor plates

Major Plates

- **Antarctica and the surrounding oceanic Plate**
- **North American Plate**
- **South American plate**
- **Pacific plate**
- **Africa plate**
- **Eurasia and the adjacent oceanic plate**
- **India-Australia-New Zealand plate**

Minor Plates

- **Cocos plate : Between Central America and Pacific plate**
- **Nazca plate : Between South America and Pacific plate**
- **Arabian plate : Mostly the Saudi Arabian landmass**
- **Philippine plate : Between the Asiatic and Pacific plate**
- **Caroline plate : Between the Philippine and Indian plate**
- **Fuji plate : North-east of Australia**



TYPES OF PLATE BOUNDARIES

- ➢ There are three types of plate boundaries
- ❖ **Divergent Boundaries**
- ❖ **Convergent Boundaries**
- ❖ **Transform Boundaries**

Divergent Boundaries or Constructive Margins

- **Area where two plates pull away from each other**
- As a result new crust is generated
- The sites where the plates move away from each other are called **spreading sites**
- The best example of divergent boundaries is the **Mid-Atlantic Ridge**, where the American Plate(s) are separated from the Eurasian and African Plates

Convergent Boundaries or Destructive Margins

- **Area where the crust is destroyed as one plate dived under another**
- The location where sinking of a plate occurs is called a **subduction zone**
- There are three ways in which convergence can occur.
  - **Between an oceanic and continental plate**
  - **Between two oceanic plates**
  - **Between two continental plates**

Transform Boundaries

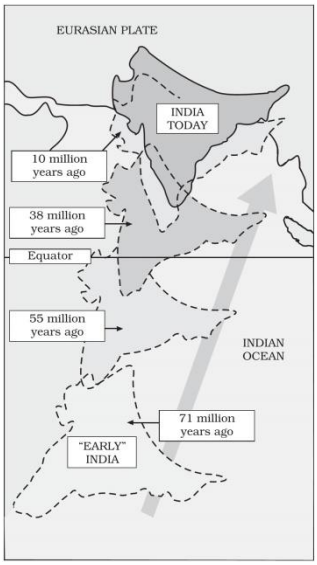
- **Area where plates slide horizontally past each other**
- crust is neither produced nor destroyed

Rates of Plate Movement

- Slowest moving plate: The Arctic ridge (less than 2.5 cm/year)
- Fastest moving plate: East pacific rise (more than 15 cm/year)

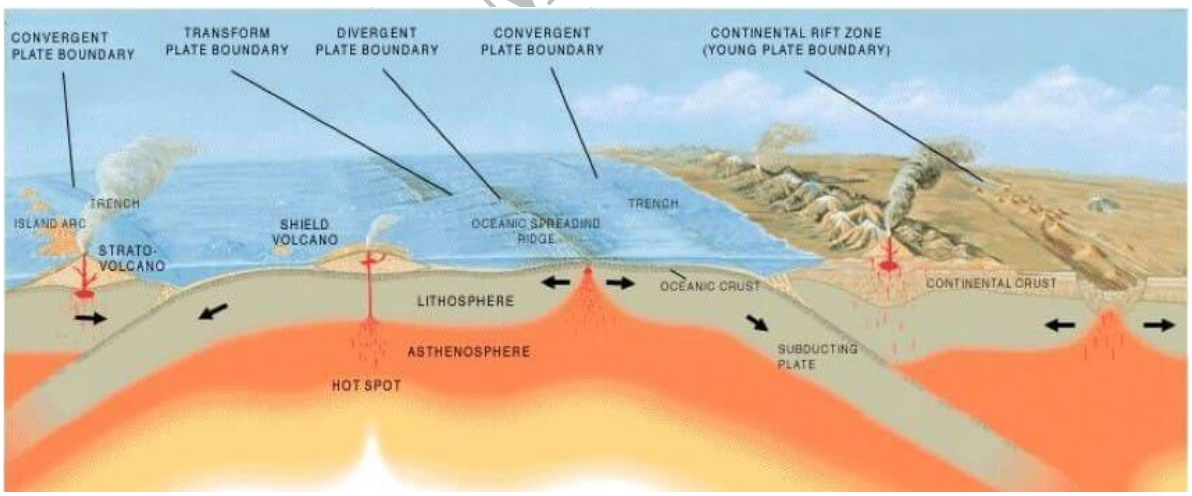
MOVEMENT OF THE INDIAN PLATE

- The Indian plate includes **Peninsular India and the Australian continental portions**
- India was a large island situated off the Australian coast, in a vast ocean
- The Tethys Sea separated it from the Asian continent till about 225 million years ago
- **India started her northward journey about 200 million years ago** at the time when Pangaea broke
- About **140 million years** before the present, the subcontinent was **located as south as 50^0S Latitude**
- During the movement of the Indian plate towards the Asiatic plate outpouring of lava takes place and led to the formation of the **Deccan Traps**
- **India collided with Asia about 40-50 million years ago** causing rapid **uplift of the Himalayas**. Scientists believe that the process is still continuing and the height of the Himalayas is rising even to this date



Concept of seafloor spreading

- Putfarwarded by **Harry H Hess** in 1961
- **Occur on the divergent plate margin**
- Hess argued that **constant eruptions at the crest of oceanic ridges cause the rupture of the oceanic crust** and the new lava wedges into it
- This pushes the oceanic crust on either side
  - **Area: Mid-ocean ridge**
- **Due to this phenomena the area of Atlantic ocean increasing on the other hand the area of Pacific ocean decreasing**



Evidences of Seafloor Spreading

- **All along the mid oceanic ridges, volcanic eruptions are common** and they bring huge amounts of lava to the surface in this area
- **The rocks on either sides of the crest of mid-oceanic ridges show remarkable similarities in terms of period of formation, chemical compositions and magnetic properties**
- **The ocean crust rocks are much younger than the continental rocks**
- The sediments on the ocean floor are unexpectedly very thin

- ❖ The deep trenches have deep-seated earthquake occurrences while in the mid-oceanic ridge areas, the quake foci have shallow depths

Ocean Floor Configuration

The ocean floor are divided into three major divisions based on the depth as well as the forms of relief

- **Continental margins**
- **Deep-sea basins**
- **Mid-ocean ridges**

Continental Margins

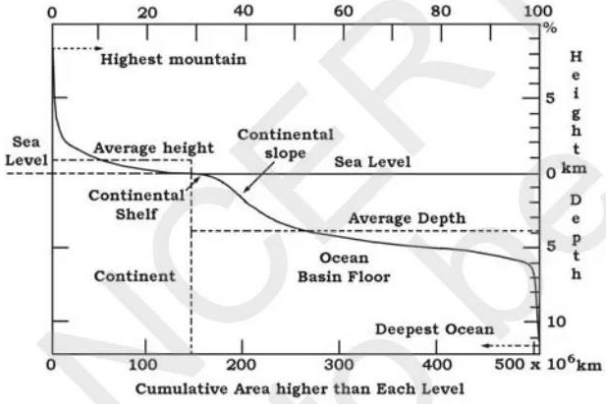
- ❖ **These form the transition between continental shores and deep-sea basins**
- ❖ **They include continental shelf, continental slope, continental rise and deep-oceanic trenches**

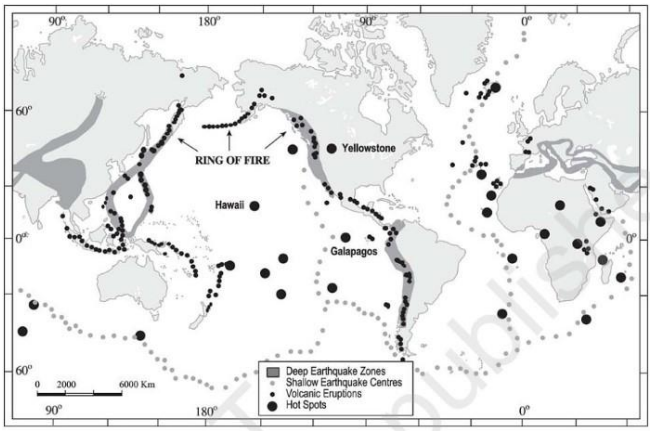
Abyssal Plains

- ❖ These are extensive plains that lie between the continental margins and mid-oceanic ridges
- ❖ The abyssal plains are the areas where the continental sediments that move beyond the margins get deposited

Mid-Oceanic Ridges

- ❖ **This are interconnected chain of mountain system within the ocean.**
- ❖ It is the longest mountain-chain on the surface of the earth submerged under the oceanic waters





EXERCISES

Multiple choice questions

1. Who amongst the following was the first to consider the possibility of Europe, Africa and America having been located side by side.

(a) Alfred Wegener (b) Antonio Pellegrini (c) Abraham Ortelius (d) Edmond Hess

Ans……

2. Polar fleeing force relates to:

(a) Revolution of the Earth (b) Gravitation (c) Rotation of the earth (d) Tides

Ans……

3. Which one of the following is not a minor plate?

(a) Nazca (b) Arabia (c) Philippines (d) Antarctica

Ans……

4. Which one of the following facts was not considered by those while discussing the concept of sea floor spreading?

(a) Volcanic activity along the mid-oceanic ridges

(b) Stripes of normal and reverse magnetic field observed in rocks of ocean floor

(c) Distribution of fossils in different continents

(d) Age of rocks from the ocean floor

Ans……

5. Which one of the following is the type of plate boundary of the Indian plate along the Himalayan Mountains?

(a) Ocean-continent convergence

(b) Divergent boundary

(c) Transform boundary

(d) Continent-continent convergence

Ans……..

6. What were the forces suggested by Wegener for the movement of the continents?
7. How are the convectional currents in the mantle initiated and maintained?
8. What is the major difference between the transform boundary and the convergent or divergent boundaries of plates?
9. What was the location of the Indian landmass during the formation of the Deccan Traps?
10. What are the evidences in support of the continental drift theory?
11. Bring about the basic difference between the drift theory and Plate tectonics
12. What were the major post-drift discoveries that rejuvenated the interest of scientists in the study of distribution of oceans and continents?

Chapter 8

COMPOSITION AND STRUCTURE OF ATMOSPHERE

Atmosphere

- Atmosphere is a **mixture of different gases and it envelopes the earth all round**
- It **contains life-giving gases like oxygen for humans and animals and carbon dioxide for plants**

COMPOSITION OF THE ATMOSPHERE

- The atmosphere is **composed of gases, water vapour and dust particles**

Gases

- Nitrogen is the leading gas on the atmosphere that **constitutes 78.08%** by volume
- Next is Oxygen which is 20.95% in volume
- The nitrogen and oxygen together make 99% of the atmospheric air by volume.

Permanent Gases of the Atmosphere

Constituent	*Formula*	*Percentage by Volume*
Nitrogen	N_2	78.08
Oxygen	O_2	20.95
Argon	Ar	0.93
Carbon dioxide	CO_2	0.036
Neon	Ne	0.002
Helium	He	0.0005
Krypto	Kr	0.001
Xenon	Xe	0.00009
Hydrogen	H_2	0.00005

Carbon Dioxide

- Carbon dioxide is **meteorologically a very important gas**
- CO_2 is **transparent to the incoming solar radiation** but **opaque to the outgoing terrestrial radiation**
- It **absorbs a part of terrestrial radiation and reflects back some part** of it towards the earth's surface
- **Carbon Dioxide is largely responsible for the greenhouse effect**
- The volume of other gases is constant but the **volume of carbon dioxide has been rising** in the past few decades mainly because of the
  - Burning of fossil fuels
  - Industralisation
  - Deforestation

Ozone

- Ozone is **found between 10 and 50 km** above the earth's surface
- **Ozone acts as a filter and absorbs the ultra-violet rays radiating from the sun and prevents them from reaching the surface of the earth**

Water Vapour

- Water vapour is also a **variable gas in the atmosphere**
- Water Vapour decreases with altitude
- In the warm and wet tropics it account for 4% of air by volume
- While in the dry and cold areas of desert and Polar Regions it is less than 1% of the air
- **It absorbs parts of the insolation from the sun and preserves the earth's radiated heat**
- **It acts like a blanket allowing the earth neither to become too cold nor too hot**
- **Water vapour contributes to the stability and instability in the air**

Dust Particles

- Dust particles are **concentrated in the lower layers of the atmosphere**
- The higher concentration of dust particles is found in **subtropical and temperate regions** due to dry winds in comparison to equatorial and Polar Regions.
- **Dust and salt particles act as hygroscopic nuclei around which water vapour condenses to produce clouds**

Sources of Dust Particles

- sea salts, fine soil, smoke-soot, ash, pollen, dust and disintegrated particles of meteors

STRUCTURE OF THE ATMOSPHERE

- On the basis of **varying density and temperature** the atmosphere is divided into 5 different layers.
- **Troposphere**
- **Stratosphere**
- **Mesosphere**
- **Thermosphere**
- **Exosphere**

Troposphere

- The troposphere is the **lowermost layer of the atmosphere**
- Its average height is 13 km
- Troposphere **extends up to height of 8 km near the poles and about 18 km at the equator**
- **Thickness of the troposphere is greatest at the equator because heat is transported to great heights by strong convectional currents**
- This layer **contains dust particles and water vapour**
- **All changes in climate and weather take place in this layer**
- The **temperature in this layer decreases at the rate of 1°C for every 165m of height (Normal lapse rate)**
- **This is the most important layer for all biological activity**
- The zone separating the troposphere from stratosphere is known as the **tropopause**
- The air temperature at the tropopause is about minus 80^0C over the equator and about minus 45^0C over the poles

- The **temperature here is nearly constant**, and hence, it is called the tropopause

Stratosphere

- The stratosphere is found above the tropopause and **extends up to a height of 50 km**
- **One important feature of the stratosphere is that it contains the ozone layer**
- This layer **absorbs ultra-violet radiation** and shields life on the earth from intense, harmful form of energy
- The boundary separating stratosphere from mesosphere is known as **Stratopause**

Mesosphere

- The mesosphere **lies above the stratosphere**, which **extends up to a height of 80 km**
- In this layer, once again, temperature starts decreasing with the increase in altitude and reaches up to minus 100^0 C at the height of 80 km.
- **The upper limit of mesosphere is known as the mesopause**

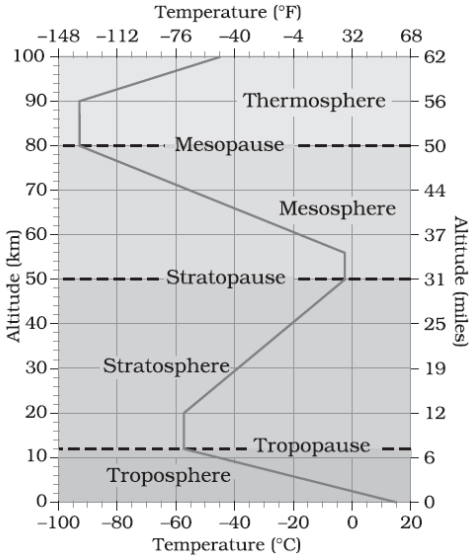
Thermosphere or Ionosphere

- The **ionosphere is located between 80 and 400 km** above the mesopause
- **It contains electrically charged particles known as ions, and hence, it is known as ionosphere. Radio waves transmitted from the earth are reflected back to the earth by this layer**
- Temperature here starts increasing with height.

Exosphere

- **The uppermost layer of the atmosphere** above the ionosphere is known as the exosphere
- This is the highest layer.

Structure of atmosphere



Elements of Weather and Climate

- Temperature, pressure, winds, humidity, clouds and precipitation

EXERCISES

Multiple choice questions

1. Which one of the following gases constitutes the major portion of the atmosphere?
   (a) Oxygen (b) Nitrogen (c) Argon (d) Carbon dioxide
   Ans……..
2. Atmospheric layer important for human beings is:
   (a) Stratosphere (b) Mesosphere (c) Troposphere (d) Ionosphere
   Ans…….
3. Sea salt, pollen, ash, smoke soot, fine soil — these are associated with:
   (a) Gases (b) Dust particles (c) Water vapour (d) Meteors
   Ans……
4. Oxygen gas is in negligible quantity at the height of atmosphere:
   (a) 90 km (b) 120 km (c) 100 km (d) 150 km
   Ans…….
5. Which one of the following gases is transparent to incoming solar radiation and opaque to outgoing terrestrial radiation?
   (a) Oxygen (b) Nitrogen (c) Helium (d) Carbon dioxide
   Ans……..
6. MATCH THE FOLLOWING

A	B
Ozone	Greenhouse effect
Nitrogen	Life giving gas
Carbon Dioxide	Absorbs the UV-rays
Oxygen	Belongs to upper layer of the atmosphere
Hydrogen	78.08%

7. Name the two gases that are the main components of the atmosphere.
8. All changes in weather and climate take place in this layer of atmosphere. Identify this layer?
9. Write any two important characteristic features of Mesosphere.
10. Carbon dioxide is meteorologically a very important gas. Why?
11. “Troposphere is considered as the most important layer of the atmosphere for all biological activities” write a brief note on this statement.
12. Name the layers of atmosphere.
13. Write any two important characteristic features of Exosphere.
14. Differentiate between Weather and Climate
15. What do you understand by atmosphere?
16. What are the elements of weather and climate?
17. Identify the layer of atmosphere to which the presence of ozone is an important feature and write the other characteristics of this layer.

18. Atmosphere is composed of Gases, dust particles and water vapour. Write short notes on each of them.
19. Illustrate and label the structure of atmosphere .Mention the characteristics of the lower most layer.
20. MATCH THE FOLLOWING

A	B	C
CO2	1^0 C per 165 meter	80-400 km
Dust particles	Radio broadcasting	0.03%
Normal Lapse rate	Greenhouse effect	Sea salt, ashes, fine soil
Ionosphere	Cloud formation	Troposphere

CHAPTER 14

MOVEMENTS OF OCEAN WATER

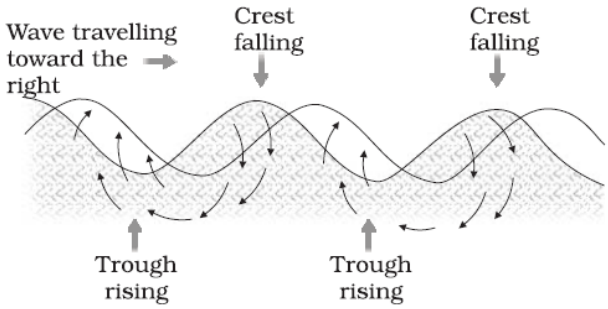
- **The horizontal motion refers to the ocean currents and waves**
- **The vertical motion refers to tides**

Waves

- **The waves are the horizontal motion of water**

Formation of Waves

- **The waves are mainly formed by wind**
- When a breeze of two knots or less blows over calm water, small ripples form and grow as the wind speed increases
- Waves travel because wind pushes the water body in its course



Characteristics of Waves

- **Wave crest and trough** : The **highest and lowest points** of a wave are called the crest and trough respectively
- **Wave height** : It is the **vertical distance from the bottom of a trough to the top of a crest** of a wave
- **Wave amplitude** : It is one-half of the wave height
- **Wave period**: It is the time interval between two successive wave crests or troughs as they pass a fixed point.
- **Wavelength**: It is **the horizontal distance between two successive crests**
- **Wave speed** : It is the rate at which the wave moves through the water, and is measured in knots
- **Wave frequency**: It is the **number of waves passing a given point during a one second time interval**

OCEAN CURRENTS

- **Ocean currents are the continuous flow of huge amount of water in a definite direction**
- **Ocean currents are like river flow in oceans**
- The **speed of a current** is termed as **"drift"**
- Drift is measured in terms of **knots**

Forces affecting movement of Ocean Currents

- Primary forces heating by solar energy
- Secondary forces that influence the currents to flow

- **Primary Forces Include**
  - ✓ **Heating by solar energy**
  - ✓ **Wind**
  - ✓ **Gravity**
  - ✓ **Coriolis force**

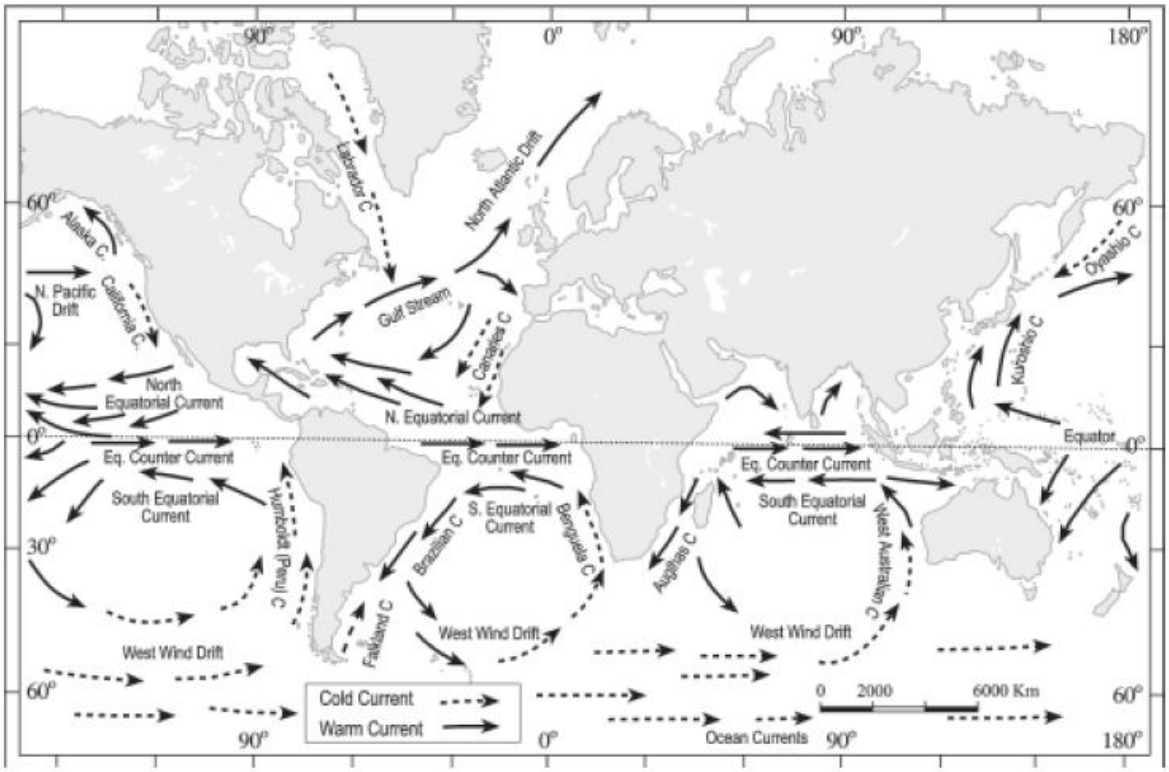
Secondary Forces

- ✓ **Salinity**
- ✓ **Difference in water density**

Types of Ocean Currents

- Classification based on depth : **surface currents and deep water currents**
- **Surface currents** constitute about 10 per cent of all the water in the ocean, these waters are the upper 400 m of the ocean
- **Deep water currents** make up the other 90 per cent of the ocean water
- These waters move around the ocean basins due to variations in the density and gravity.
- Classification Based on Temperature: **Cold currents and Warm currents**
- Cold currents **bring cold water into warm water areas**
- These currents are usually **found on the west coast of the continents** in th**e low and middle** and on the **east coast in the higher latitudes in the Northern Hemisphere**
- warm currents bring **warm water into cold water areas** and are usually observed on the **east coast of continents in the low and middle latitudes**

Major Ocean Currents



Currents of the Pacific Ocean

Sl No	Name	Nature
1	Kuroshio	Warm
2	Alaska	Warm
3	North Drift	Warm
4	Oyashio	Cold
5	California	Cold
6	Humboldt or Peru. C	Cold

Currents of the Atlantic Ocean

Sl No	Name	Nature
1	Gulf Stream	Warm
2	North Atlantic Drift	Warm
3	Brazilian .C	Warm
4	Labrador .C	Cold
5	Canaries .C	Cold
6	Falkland .C	Cold
7	Benguela. C	Cold

Currents of the Indian Ocean

Sl No	Name	Nature
1	Monsoon .C	Warm
2	Agulhas .C	Warm
3	West Australian .C	Cold

Effects of Ocean Currents

- The mixing of warm and cold currents help to **replenish the oxygen and favour the growth of planktons**, the primary food for fish population
- Formation of fog
- marine climate
- Regulate global climate
- Bringing warm water into polar region and cold water into tropical region

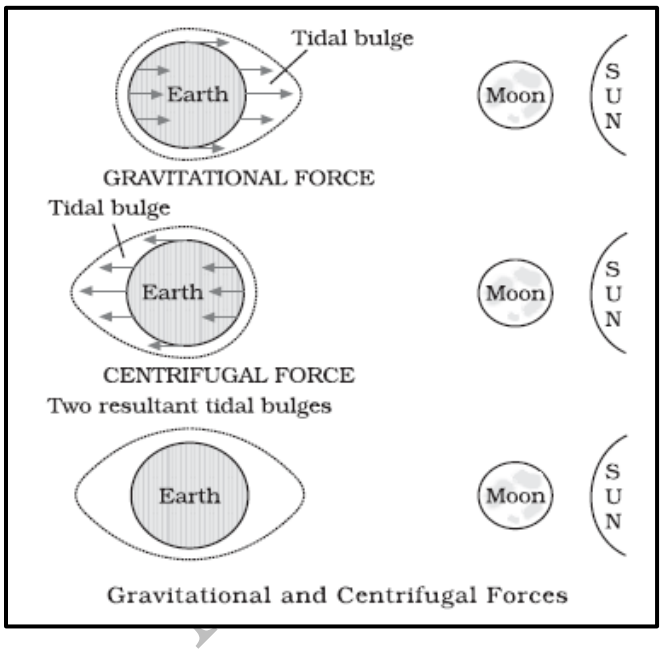
TIDES

- **The periodical rise and fall of the sea level, once or twice a day, mainly due to the attraction of the sun and the moon, is called a tide**

- **Movement of water caused by meteorological effects (winds and atmospheric pressure changes) are called surges**

Formation of Tides

- **The gravitational Force of Sun, moon and earth, and Centrifugal Force**
- Together, **the gravitational pull and the centrifugal force are responsible for creating the two major tidal bulges on the earth**
- On the side of the earth facing the moon, a tidal bulge occurs
- while on the opposite side though the gravitational attraction of the moon is less as the centrifugal force causes tidal bulge on the other side



- When the **tide is channelled between islands or into bays and estuaries** they are called **tidal currents**
- **The highest tides in the world occur in the Bay of Fundy in Nova Scotia, Canada**.

Types of Tides

Tides based on Frequency

Semi-diurnal tide

- The most common tidal pattern
- **Two high tides and two low tides each day**
- The successive high or low tides are approximately of the same height.

Diurnal tide

- **Only one high tide and one low tide during each day**
- The successive high and low tides are approximately of the same height

Mixed tide

- Tides having **variations in height** are known as mixed tides
- These tides generally occur along the west coast of North America and on many islands of the Pacific Ocean

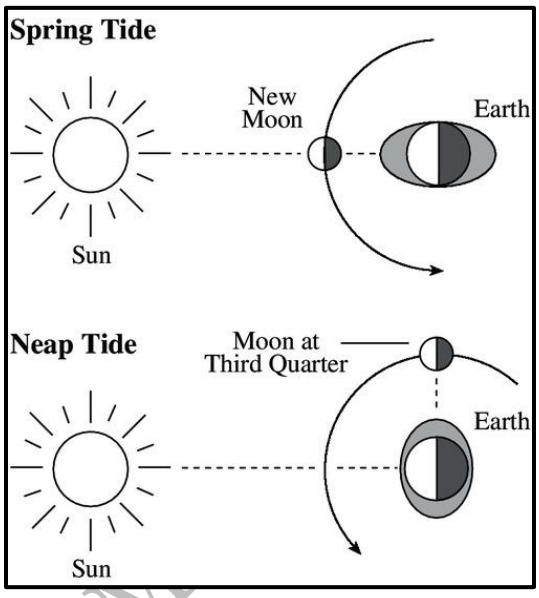
Tides based on the Sun, Moon and the Earth Positions

Spring tides

- **When the sun, the moon and the earth are in a straight line,** the height of the tide will be higher and are called Spring Tide
- **They occur twice a month, one on full moon period and another during new moon period**.

Neap tides

- There is a **seven day interval** between the spring tides and neap tides
- **When the sun and moon are at right angles to each other and the forces of the sun and moon tend to counteract one another.**



- Once in a month, **when the moon's orbit is closest to the earth (perigee),** unusually high and low tides occur
- **When the moon is farthest from earth (apogee),** the moon's gravitational force is limited and the tidal ranges are less than their average heights.
- **When the earth is closest to the sun (perihelion)**, around 3rd January each year, tidal ranges are also much greater
- **When the earth is farthest from the sun** (**aphelion),** around 4th July each year, tidal ranges are much less than average.
- **Ebb: The time between the high tide and low tide, when the water level is falling, is called the ebb.**
- **Flow or Flood: The time between the low tide and high tide, when the tide is rising, is called the flow or flood**

Importance of Tides

- This helps the navigators and fishermen plan their activities
- Tidal flows are of great importance in navigation
- Helps desilting the sediments and in removing polluted water from river estuaries
- Tides are used to generate electrical power

EXERCISES

Multiple choice questions.

1. Upward and downward movement of ocean water is known as the :
   (a) Tide (b) current (c) wave (d) none of the above
   Ans……
2. Spring tides are caused :
   (a) As result of the moon and the sun pulling the earth gravitationally in the same direction
   (b) As result of the moon and the sun pulling the earth gravitationally in the opposite direction
   (c) Indention in the coast line
   (d) None of the above
   Ans……..
3. The distance between the earth and the moon is minimum when the moon is in :
   (a) Aphelion (b) Perigee (c) Perihelion (d) Apogee
   Ans…….
4. The earth reaches its perihelion in:
   (a) October (b) September (c) July (d) January
   Ans……
5. Categorize the tides based on the position of the sun and moon with respect to the earth and differentiate between them.
6. Give single term for the following
   a. The horizontal distance between two successive wave crests.
   b. The cold current that flows off the coast of west Africa
7. Identify the phenomenon of the periodic rise and fall of the sea level once or twice a day
   a. Mention any two major causes for its occurrence
   b. Cite any two of its importance
8. "Tides vary in their frequency, direction and movement from place to place and time to time" based on this statement, classify tides
9. The ocean currents influence human activities. Substantiate this statement
10. The periodic rise and fall of sea level is called…….
    a. Waves b. Tide c. Currents d. Drifts
    Ans……
11. The term "storm surge" refers to…..
    a. Severe drought due to dry winds
    b. Abnormal rise in sea level due to cyclone
    c. Flash flood due to heavy rain
    d. Flood due to landslides
    Ans……

INDIA PHYSICAL ENVIRONMENT

CHAPTER 1

INDIA LOCATION

- The mainland of India, extends from Ladakh in the north to Kanniyakumari in the south and Arunachal Pradesh in the east to Gujarat in the west
- **Geographical area of India:** 32, 87,263 **(2.4% of World area)**
- **Latitudinal Extension of India**: 8^0 4' N to 37^0 6' N
- **Longitudinal Extension of India**: 68^0 7' E to 97^0 25' E
- **Southernmost point of India**: Indira Point (6°45' N latitude in the Bay of Bengal)
- **The Southernmost point of Indian Mainland**: Cape Comarin or Kanyakumari
- **North and South Distance of India**: 3214 Km
- **East West distance of India**: 2933 Km
- **The distance between two adjacent latitudes**: 111Km
- **Use of Longitude or Meridian**: For calculating time
- **Standard meridian of India**: 82°30' E Longitude

❖ **While the sun rises in the northeastern states about two hours earlier as compared to Jaisalmer, the watches in Dibrugarh, Imphal in the east and Jaisalmer, Bhopal or Chennai in the other parts of India show the same time**

The total number of longitude passes through India: 30^0

Time increases at the rate of 4 minute per 1^0 longitudes east of the Prime Meridian

The difference between East and Western Longitude: 30^0

Therefore, 30x4= 120 120/60= 2 Hour

❖ **Indian Standard Time (IST) is ahead of Greenwich Mean Time by 5 hours and 30 minutes**

The standard Meridian of India: 82°30' E Longitude

The Longitudinal Value of Greenwich Meridian: 0^0

Time increases at the rate of 4 minute per 1^0 longitudes east of the Prime Meridian

The difference between Greenwich and Standard Meridian of India: 82^0 30 minutes

Therefore, 82x4= 328 328+2=330/60= 5 Hour 30 minutes

5 Hour and 30 Minutes approximately

- **The Important latitude passes through India which divide country into two halves (Northern and Peninsular India)**: Tropic Of cancer 23^0 30' N Latitude
- **The important states through which the tropic of cancer passes:** Gujarat, Rajasthan, Madhya Pradesh, Chhattisgarh, Jharkhand, West Bengal, Tripura and Mizoram
- **The places in India through which Standard meridian Passes:** Uttar Pradesh, Madhya Pradesh Chhattisgarh, Orissa and Andhra Pradesh
- **The length of Mainland coastline of India:** 6100Km

- **The length of coastline of India including Island groups**: 7516.6 Km
- **India's territorial limit further extends towards the sea upto 12 nautical miles (about 21.9 km) from the coast**

Coastal State of India

1. **Gujarat**
2. **Maharashtra**
3. **Goa**
4. **Karnataka**
5. **Kerala**
6. **Tamil Nadu**
7. **Andrapradesh**
8. **Odisha**
9. **West Bengal**

- **Land Neighbouring Countries of India:** Pakistan, Afghanistan, China, Nepal, Bhutan, Bangladesh and Myanmar
- **The countries which are larger than India:** Russia, Canada, China, U S A, Brazil, Australia
- **The two Island Countries located in the Indian Ocean**: Sri Lanka and Maldives
- **Sri Lanka is separated from India by the Gulf of Mannar and Palk Strait**

India as Subcontinent

- The size of India has endowed her with **great physical diversity**
- Presence of lofty mountains in the north, large rivers such as Ganga, Brahmaputra, Mahanadi, Krishna, Godavari and Kaveri, green forested hills in northeast and south India; and the vast sandy expanse of Marusthali
- Himalayas in the north, Hindukush and Sulaiman ranges in the northwest, Purvachal hills in the north-east and by the large expanse of the Indian ocean in the south, it forms a great geographic entity known as the Indian subcontinent
- **Countries forming Indian Subcontinent**: Pakistan, Nepal, Bhutan, Bangladesh and India
- **The country that shares the longest land frontier with India: Bangladesh**

Gulf and Strait

- A strait is a **naturally formed narrow passage of water that connects larger water bodies**
  E.g. Palk Strait, Strait of Gibraltar
- Gulf is a **portion of sea that penetrates the land**
  E.g. Persian Gulf, Gulf of Kutch
- **Northernmost administrative division of India: Ladakh (Union Territory)**
- **Southernmost state of India: Tamil Nadu**
- **Easternmost State of India: Arunachal Pradesh**
- **Westernmost State of India: Gujarat**
- **Largest State: Rajasthan**
- **Smallest State: Goa**

The two major Island group of India

- **Lakshadweep (Arabian Sea- Coral Island of India)**
- **Andaman and Nicobar Islands (Bay of Bengal- Volcanic Island of India)**

India Administrative Divisions

Sl No	State	Capital
1	West Bengal	Kolkata
2	Uttarakhand	Dehradun
3	Uttar Pradesh	Lucknow
4	Tripura	Agartala
5	Telangana	Hyderabad
6	Tamil Nadu	Chennai
7	Sikkim	Gangtok
8	Rajasthan	Jaipur
9	Punjab	Chandigarh
10	Odisha	Bhubaneswar
11	Nagaland	Kohima
12	Mizoram	Aizawl
13	Meghalaya	Shillong
14	Manipur	Imphal
15	Maharashtra	Mumbai
16	Madhya Pradesh	Bhopal
17	Kerala	Thiruvananthapuram
18	Karnataka	Bangalore
19	Jharkhand	Ranchi
20	Himachal Pradesh	Shimla
21	Haryana	Chandigarh
22	Gujarat	Gandhinagar
23	Goa	Panaji
24	Chhattisgarh	Raipur
25	Bihar	Patna
26	Assam	Dispur
27	Arunachal Pradesh	Itanagar
28	Andhra Pradesh	Hyderabad

Sl No	Union territory	Capital
1	Andaman and Nicobar Islands	Port Blair
2	Chandigarh	Chandigarh
3	Dadra and Nagar Haveli and Daman and Diu	Daman
4	Jammu and Kashmir	Srinagar(Summer) Jammu(Winter)
5	Ladakh	Leh(Summer) Kargil (Winter)
6	Delhi	New Delhi
7	Lakshadweep	Kavaratti
8	Puducherry	Puducherry

EXERCISES

1. Which one of the following latitudinal extent is relevant for the extent of India's area?

(a) 8°41'N - 35°7'N (b) 8°4'N - 37°6'N (c) 8°4'N - 35°6'N (d) 6°45'N - 37°6'N

Ans……..

2. Which one of the following countries shares the longest land frontier with India?

(a) Bangladesh (b) China (c) Pakistan (d) Myanmar

Ans……..

3. Which one of the following countries is larger in area than India?

(a) China (b) Egypt (c) France (d) Iran

Ans……..

4. Which one of the following longitudes is the standard meridian for India?

(a) 69°30'E (b) 82°30'E (c) 75°30'E (d) 90°30'E

Ans……..

5. While the sun rises earlier in the east, say Nagaland and also sets earlier, how do the watches at Kohima and New Delhi show the same time?

6. Differentiate between a Gulf and a Strait

7. Why India is often described as a sub-continent? Justify

8. Mention….

a. The countries which form the Indian Sub-continent

b.The two Island nations located in the Indian Ocean, treated as neighbours of India

9. If you are travelling from Kandla port to Kolkatha through the coastal plain of India, name the states you can see on these routes

10. Name the Island group which is located in the western part of the Indian union.

Chapter 2

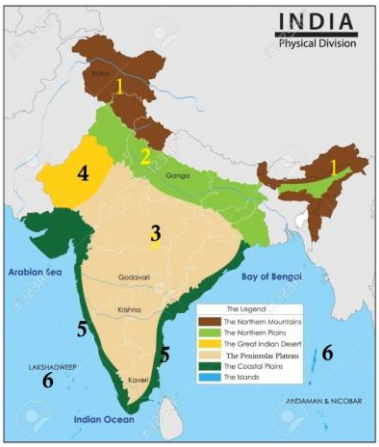
STRUCTURE AND PHYSIOGRAPHY

PHYSIOGRAPHY

- The land of India is characterised by great diversity in its physical features
- Based on macro variations, India can be divided into the following physiographic divisions

PHYSIOGRAPHIC DIVISIONS OF INDIA

1. **The Northern and North-Eastern Mountains**
2. **The Northern Plain**
3. **The Peninsular Plateau**
4. **The Indian Desert**
5. **The Coastal Plains**
6. **The Islands**



The North and Northeastern Mountains

- The North and Northeastern Mountains **consist of the Himalayas and the Northeastern hills**
- The total **length** of the Himalaya is **2500 km from East to West**
- The **width** varies between **160-400 km from North to South**
- The Himalayas consist of a **series of parallel mountain ranges**, They are
  - **Greater Himalayan or Himadri**
  - **Lesser Himalaya or middle or Himachal**
  - **The outer Himalaya or Shiwalik**

Importance of Himalaya

- **Himalayas stand like a strong and long wall** between the Indian subcontinent and the Central and East Asian countries
- Himalaya also a **climatic, drainage and cultural divide**
- There are large-scale regional variations within the Himalayas
- On the basis of **relief, alignment of ranges and other geomorphological features**, the Himalayas can be divided into,

Longitudinal Divisions of Himalaya

I. **Kashmir or Northwestern Himalayas**
II. **Himachal and Uttaranchal Himalayas**
III. **Darjiling and Sikkim Himalayas**
IV. **Arunachal Himalayas**
V. **Eastern Hills and Mountains**

Kashmir or Northwestern Himalayas

- It comprise a series of ranges such as the **Karakoram, Ladakh, Zaskar and Pir Panjal**
- Lies the world famous **valley of Kashmir and the famous Dal Lake**
- **Important glaciers** of South Asia : Baltoro and Siachen
- Famous for **Karewa formations**

Karewas

- Karewas are **the thick deposits of glacial clay and other materials embedded with moraines**
- Karewas are **useful for the cultivation of Zafran**

- **Passes** : Zoji La, Banihal, Photu La, Khardung La
- The **highest peak of India Mount K2** situated on karakoram
- **Fresh water Lakes**: Dal and Wular
- **Salt water lakes**: Pangong Tso and Tso Moriri
- This region is **drained by** the **river Indus**, and its tributaries such as the **Jhelum and the Chenab**
- well-known for their scenic beauty and picturesque landscape
- **Famous pilgrimage centres**: Vaishno Devi, Amarnath Cave, Charar -e-Sharif,
- **Srinagar**, city of Jammu and Kashmir is located on the banks of **Jhelum river**
- The southernmost part of this region consists of longitudinal valleys known as 'duns'. Example: Jammu dun and Pathankot dun

Dunes

- **Longitudinal valleys** are known as Dunes
- Example: Dehra dun, Jammu dun and Pathankot

The Himachal and Uttarakhand Himalayas

- Lies between the **river Ravi in the west** and the **Kali in the east**
- It is **drained** by two major river **Indus and the Ganga**
- Himachal Himalaya is an extension of the Ladakh cold desert
- All the **three ranges of Himalayas are prominent** in this section such as greater Himalaya, lesser Himalaya and Shiwalik
- **Hill stations**: Dharamshala, Mussoorie, Shimla, Kaosani
- **Dunes**: Dehra Dun, Harike dun and the Kota dun, etc.
- **Dehra Dun** is the largest dunes
- valleys are mostly inhabited by the Bhotia's, nomadic groups who migrate to 'Bugyals'
- **'Valley of flowers'** is situated in this region
- **Pilgrimage centres**: Gangotri, Yamunotri, Kedarnath, Badrinath and Hemkund Sahib
- The region is also known to have five famous **Prayags (river confluences)**

The Darjiling and Sikkim Himalayas

- They are flanked by **Nepal Himalayas in the west** and **Bhutan Himalayas in the east**
- Known for its **fast-flowing rivers Tista**
- **Kanchenjunga**, **second highest peak in India** located in this region
- The higher reaches of this region are inhabited by Lepcha Tribes
- The British introduced tea plantations in this region
- **'duar formations'**- **alluvial flood plain**

The Arunachal Himalayas

- Extend from the **east of the Bhutan Himalayas** up to the **Diphu pass in the east**
- **Mountain peaks**: Kangtu and Namcha Barwa
- **Rivers**: kemang, Subansiri, the Dihang, the Dibang and the Lohit
- **Tribal community** are monpa, daffla, mishmi,abor etc.
- People depending **jhuming or slash and burn cultivation**

The Eastern Hills and Mountains

- This part of Himalayan region **lies north to south direction**
- They know by **different names** such as **Patkai Bum, Naga hills, the Manipur hills** in the north
- **Mizo and Lushai** in the south
- The presence of a **large lake** known as **'Loktak' (Manipur)**
- **Molassis basin Mizoram**
- Molassis Basin' which is **made up of soft unconsolidated deposits**

The Northern Plains

- The northern plains are **formed by the alluvial deposits brought by the rivers** – the Indus, the Ganga and the Brahmaputra
- These plains **extend 3,200 km from the east to the west**
- The average **width** varies between **150-300 km**
- The maximum **depth of alluvium** deposits varies between **1,000-2,000 m**
- From the north to south plain can be divided into three major zones

Divisions of North Indian Plain

1. **Bhabar**
2. **Terai**
3. **Alluvial plain: Bhangar and Khadar**

Bhabar	Terai
❖ **Narrow belt ranging between 8-10 km** ❖ Parallel to the Shiwalik foothills ❖ The streams and rivers coming from the mountains deposit heavy materials of rocks and boulders ❖ **Rivers disappear** in this zone	❖ **South of the Bhabar** is the Tarai belt ❖ **width of 10-20 km** ❖ where **streams and rivers re-emerge** without having any properly demarcated channel ❖ creating **marshy and swampy** conditions ❖ **luxurious growth of natural vegetation and houses a varied wild life**

Alluvial Plains

- ❖ The south of Tarai is a belt consisting of Alluvial Plains- **Bhangar and Khadar**
- ➢ Bhangar: The **new alluvial deposit**
- ➢ Khadar: The **old alluvial deposit**
- ❖ Known for **Sunderban Delta**, the largest delta in the world

The Peninsular Plateau

- ❖ **Irregular triangle shaped** block of land known as the **peninsular Plateau**
- ❖ Formed by mainly **solidification of lava**
- ❖ Average elevation **600-900 meters**
- ❖ This is one of the **oldest and the most stable landmass of India**
- ❖ The general slope of the plateau is from the **west to the east**
- ❖ **Important Soil: Black Soil**
- ❖ Its extension is
- ➢ North : Delhi ridge
- ➢ East: Rajmahal hill
- ➢ South: Cardamom hill
- ➢ West: Gir range
- ❖ On the basis of the prominent relief features, the Peninsular plateau can be divided into three broad groups

Division of Peninsular Plateau

1. The Deccan Plateau
2. The Central Highlands
3. The Northeastern Plateau

The Deccan Plateau

- Bordered by the Western Ghats in the west, Eastern Ghats in the east and the Satpura, Maikal range and Mahadeo hills in the north
- The **highest peak** in peninsular plateau : **'Anaimudi'** (2,695 m) located in **Anaimalai hills** (Western Ghats)
- The **second highset peak**: **Dodabetta** (2,637 m) located on the **Nilgiri hills**

Western Ghats	Eastern Ghats
❖ Average elevation is 1,500 m ❖ **Higher in elevation and are continuous** ❖ Most of the Peninsular rivers have their origin in the Western Ghats ❖ Locally known by **different names** such as ➢ **Sahyadri** in Maharashtra ➢ **Nilgiri hills** in Karnataka and Tamil Nadu ➢ **Anaimalai hills** and **Cardamom hills** in Kerala	❖ Comprising the **discontinuous and low hills** ❖ Highly eroded by the rivers such as the Mahanadi, the Godavari, the Krishna, the Kaveri, etc ❖ **Jindhagada** (1690m) is the highest peak in the Eastern Ghats ❖ Important ranges include the Javadi hills, the Palconda range, the Nallamala hills, the Mahendragiri hills

- The **Western and Eastern Ghats meet each other at the Nilagiri hills**
-

The Central Highlands

- It is a classic example of the **relict mountains**
- They are bounded by
  - west by the Aravali range
  - South by Satpura range
- Most of the **tributaries of the river Yamuna** originating from Central Highlands

The Northeastern Plateau

- It is an **extension of the main Peninsular plateau**
- Meghalaya and Karbi Anglong plateau stand detached from the main Peninsular Block
- The Meghalaya plateau is further **sub-divided into three**:
  (i)The Garo Hills
  (ii) The Khasi Hills
  (iii) The Jaintia Hills
- This area receives maximum rainfall from South West Monsson
- Example: Cherrapunji, Mawsynram

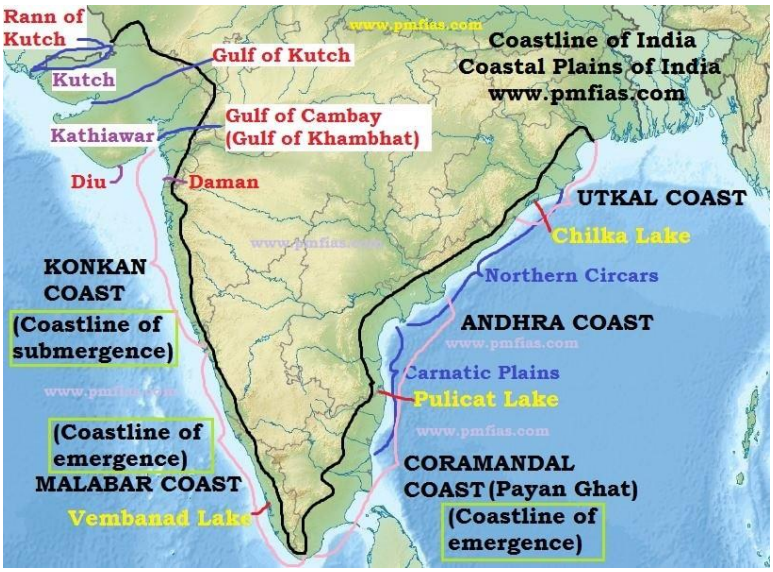
The Indian Desert

- Located on the **northwest of the Aravali hills**
- Known as **Thar desert or the Great Indian desert**
- It is a land of undulating topography dotted with **longitudinal dunes and barchans**

- ❖ Region receives low rainfall below 150 mm per year
- ❖ Known as **Marusthali** because of **arid climate with low vegetation cover**
- ❖ It has two sub division- Northern part sloping towards Sind, Southern parts sloping towards Rann of Kachchh
- ❖ Most of the rivers in this region are ephemeral
- ❖ **Important River**: **Luni (only river flowing through desert in India)**
- ❖ Important lake: Sambhar (Salt Water lake)

The Coastal Plains

- ➢ On the basis of the **location and active geomorphological processes**, it can be broadly divided into two:
- ❖ **The western coastal plains**
- ❖ **The eastern coastal plains**



Difference between Western and Eastern Coastal Plain

Western Coastal Plain	Eastern Coastal Plain
❖ Extending from the **Gujarat coast in the north to the Kerala coast in the south**	❖ Extends from **Kanyakumari** in South(Tamil Nadu) to **Sunderban delta** in North(West Bengal)
❖ western coastal plains are **narrow in the middle and broader towards north and south**	❖ The eastern coastal plain is **broader**
❖ Example for **submerged coastal plain**	❖ Example for **Emerged coastal plain**
❖ Provides **natural conditions for the development of ports and harbours**	❖ Rivers flowing through this area form deltas (Mahanadi,Godavari,Krishna and the Kaveri)
❖ **Ports**: Kandla, Mazagaon, JLN port Nava Sheva, Marmagao, Mangalore, Cochin, etc	❖ Due to emergent nature, it has **less number of ports and harbours**
❖ Divided into–	❖ **Ports**:Kolkatha,Haldia,Paradweep, Visakapatanam, Ennore, Chennai, Tutticorin
➢ **Kachchh and Kathiawar** coast in Gujarat	❖ Divided into
	➢ **Coramandel Coast** in Tamil Nadu and

➢ **Konkan coast** in Maharashtra, ➢ **Goan coast** ➢ **Malabar coast** in Karnataka and Kerala ❖ The rivers flowing through this coastal plain **do not form any delta** ❖ The Malabar coast has **'Kayals' (backwaters)** ❖ Nehru Trophy Vallamkali (boat race) is held in Punnamada Kayal	Andrapradesh ➢ **Northern Circars** in Odisha

The Islands

- There are **two major island groups in India**

1. **Lakshadweep** island in Arabian Sea
2. **Andaman Nicobar** island in Bay of Bengal

Andaman and Nicobar island

- Andaman and Nicobar island **located in Bay of Bengal**
- These are scattered between 6° N- 14° N latitude and 92°E -94° E longitude
- They are **volcanic origin**
- The **Barren Island** is the only active volcano in India
- There are approximately **572 islands**
- **Capital**: Port Blair
- The entire group of island is divided into two broad categories– the Andaman in the north and the Nicobar in the south
- They are separated by a water body which is called the **Ten degree channel**
- Mountain Peak: Saddle peak

Lakshadweep

- The islands of the Arabian Sea include **Lakshadweep and Minicoy**
- These are scattered between 8°N-12° N latitude and 71°E -74° E longitude
- The entire island group is built of **coral deposits**
- There are approximately **36 islands** of which **11 are inhabited**
- **Capital:** Kavarati
- **Minicoy** is the **largest island** with an area of 453 sq. km
- The **Eleventh degree** (11^{th} degree) channel divided the entire Island groups into two
- North is the **Amini Island** and south is the **Canannore Island**

EXERCISES

1. In which part of Himalayas do we find the Karewa formation?

   Ans:…….

2. Name the State where Loktak Lake situated?

   Ans……

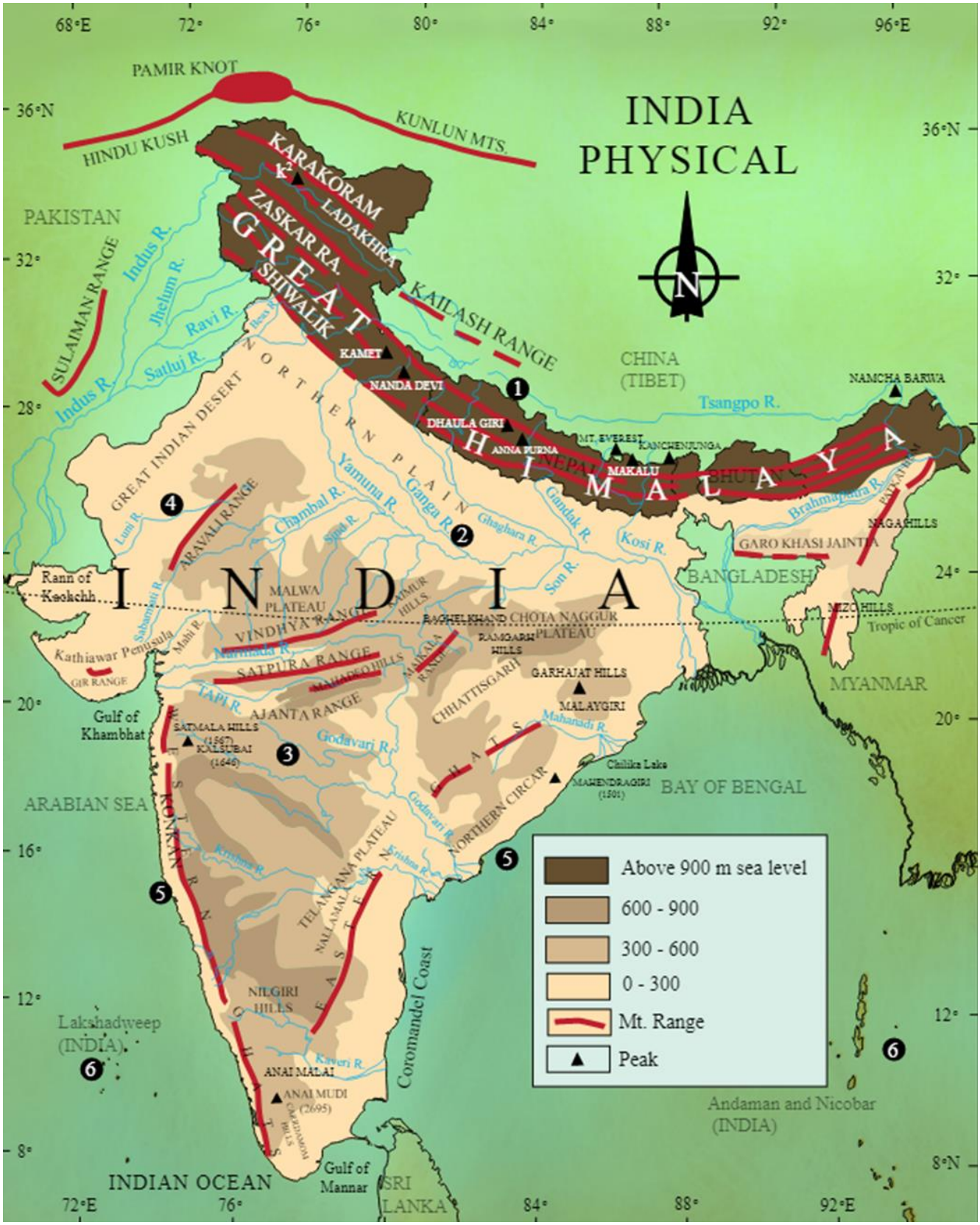
3. Name the water bodies separates the Andaman from the Nicobar?

   Ans…….

4. The hill range where the 'Dodabeta' peak situated ?

   Ans……

5. Himalayas are forme by three parallel mountain ranges. Identify the Southern most range among these
6. Give a brief account of the physiographic division of India formed by the alluvial deposits brought by the rivers. Specify its dub-divisions
7. write a short note on the physiographic division of India found in the North Western part of aravalli mountains
8. On the basis of relief variations, the peninsular plateaus are sub divided into different divisions.what are they. Describe any one
9. Distinguish between Bhabhar and Tarai
10. West coastal plain in India is different from east coastal plain in many of its features. Substantiate the statement through any three distinguishing features
11. Mention any two characteristics features of the India desert (Marusthali)
12. Make a comparison of the Western Ghats and the Eastern Ghats of India
13. Make a comparison of the island groups of the Arabian Sea and the Bay of Bengal
14. The land of India is characterised by great diversity in physical features. Mention the physiographic division of India and discuss any one of them in detail
15. Explain about the northern most physiographical division of India, with its sub-divisions


INDIA
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PAMIR KNOT
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KUNLUN MTS.
KARAKORAM
LADAKH RA.
ZASKAR RA.
GREAT
SHIWALIK
KAILASH RANGE
SULAIMAN RANGE
PAKISTAN
Indus R.
Jhelum R.
Ravi R.
Satluj R.
Beas R.
KAMET
NANDA DEVI
DHAULA GIRI
ANNA PURNA
MT. EVEREST
KANCHENJUNGA
MAKALU
NAMCHA BARWA
CHINA
(TIBET)
Tsangpo R.
HIMALAYA
NEPAL
BHUTAN
NORTHERN PLAIN
GREAT INDIAN DESERT
Luni R.
ARAVALI RANGE
Chambal R.
Yamuna R.
Ganga R.
Ghaghara R.
Gandak R.
Kosi R.
Brahmaputra R.
PATKAI HILLS
NAGA HILLS
GARO KHASI JAINTIA
Rann of Kachchh
INDIA
MALWA PLATEAU
VINDHYA RANGE
Son R.
BAGHELKHAND CHOTA NAGGUR PLATEAU
RAMGARH HILLS
BANGLADESH
MIZO HILLS
Tropic of Cancer
Kathiawar Peninsula
GIR RANGE
Mahi R.
Narmada R.
SATPURA RANGE
MAHADEO HILLS
MAIKALA RANGE
CHHATTISGARH
GARHJAT HILLS
MALAYGIRI
MYANMAR
Gulf of Khambhat
TAPI R.
AJANTA RANGE
SATMALA HILLS
(1567)
KALSUBAI
(1646)
Godavari R.
Mahanadi R.
EASTERN GHATS
Chilika Lake
MAHENDRAGIRI
(1501)
BAY OF BENGAL
ARABIAN SEA
WESTERN GHATS
KONKAN
Krishna R.
Godavari R.
NORTHERN CIRCAR
TELANGANA PLATEAU
NALLAMALAI HILLS
Krishna R.
NILGIRI HILLS
Kaveri R.
ANAI MALAI
ANAI MUDI
(2695)
CARDAMOM HILLS
Coromandel Coast
Lakshadweep
(INDIA)
Andaman and Nicobar
(INDIA)
INDIAN OCEAN
Gulf of Mannar
SRI LANKA
Above 900 m sea level
600 - 900
300 - 600
0 - 300
Mt. Range
Peak
68°E
72°
76°
80°
84°
88°
92°
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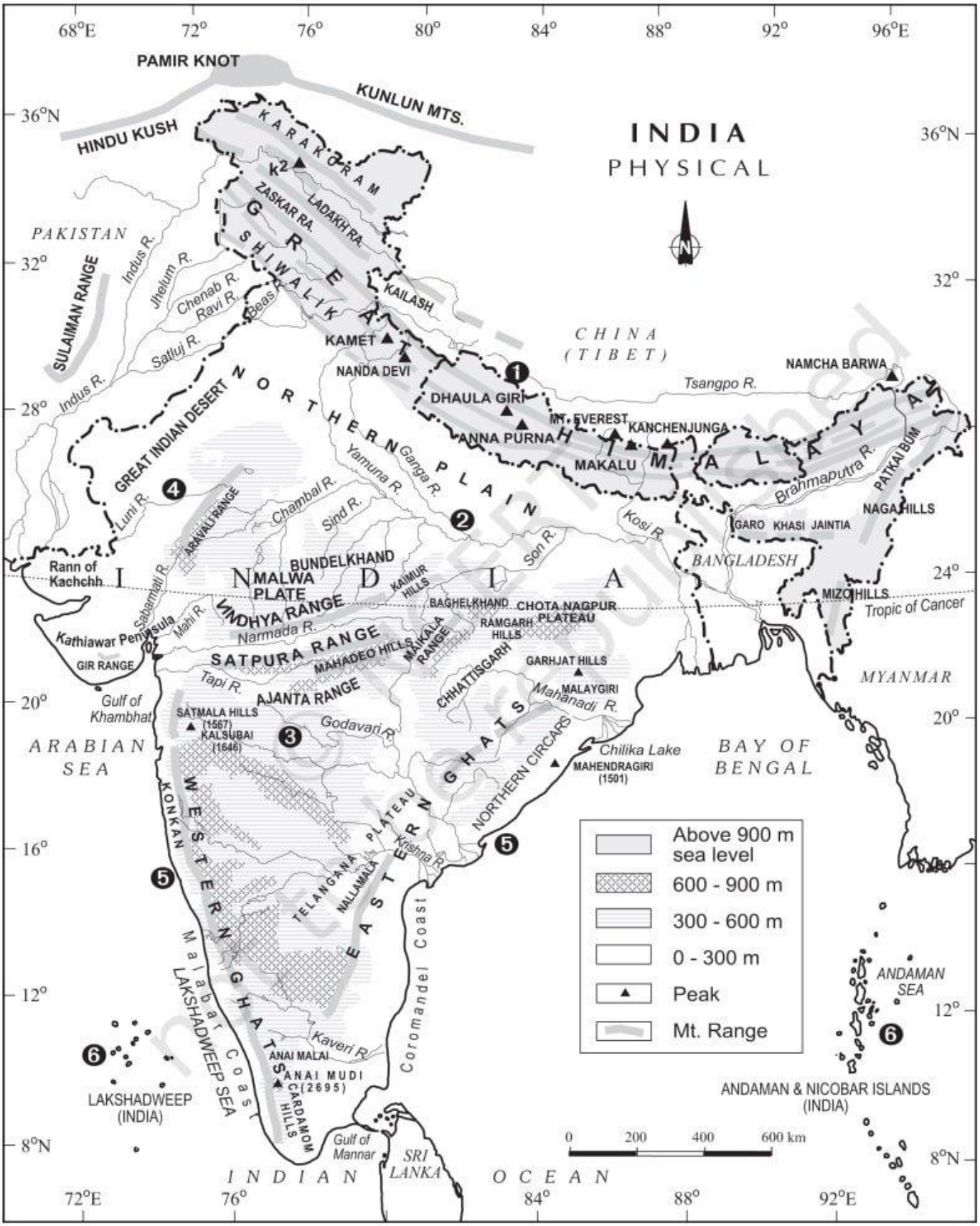
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0 - 300 m
Peak
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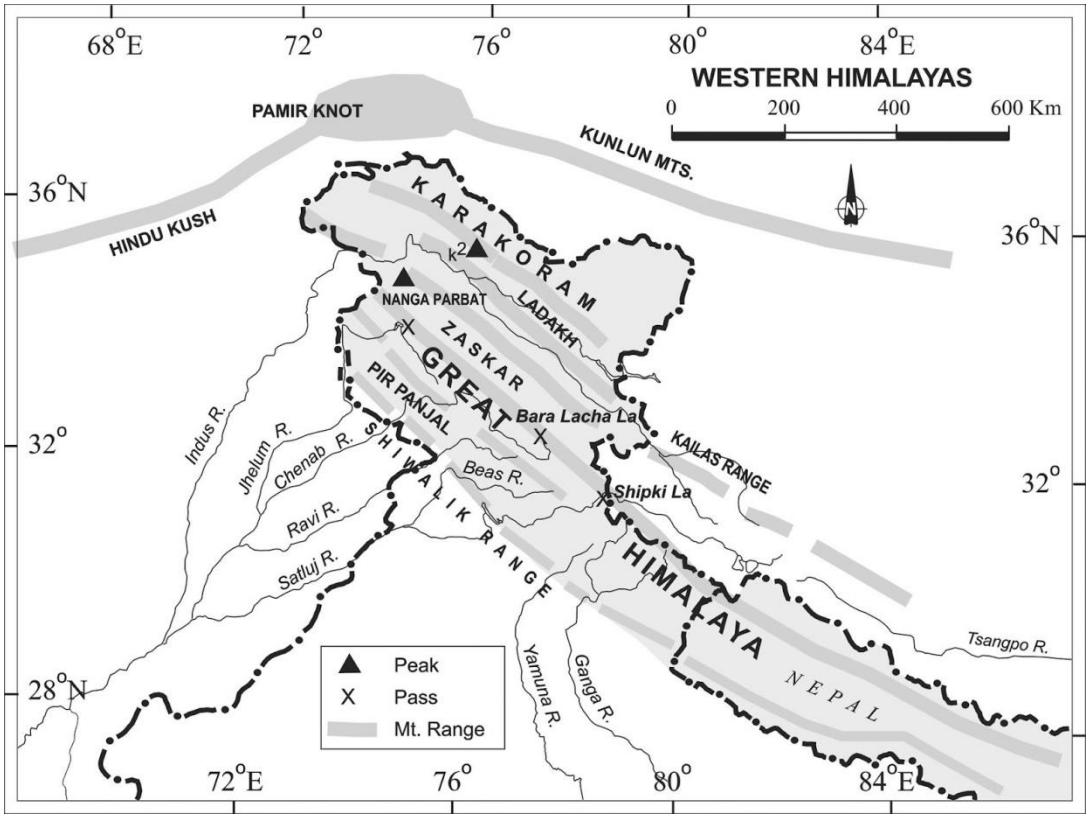
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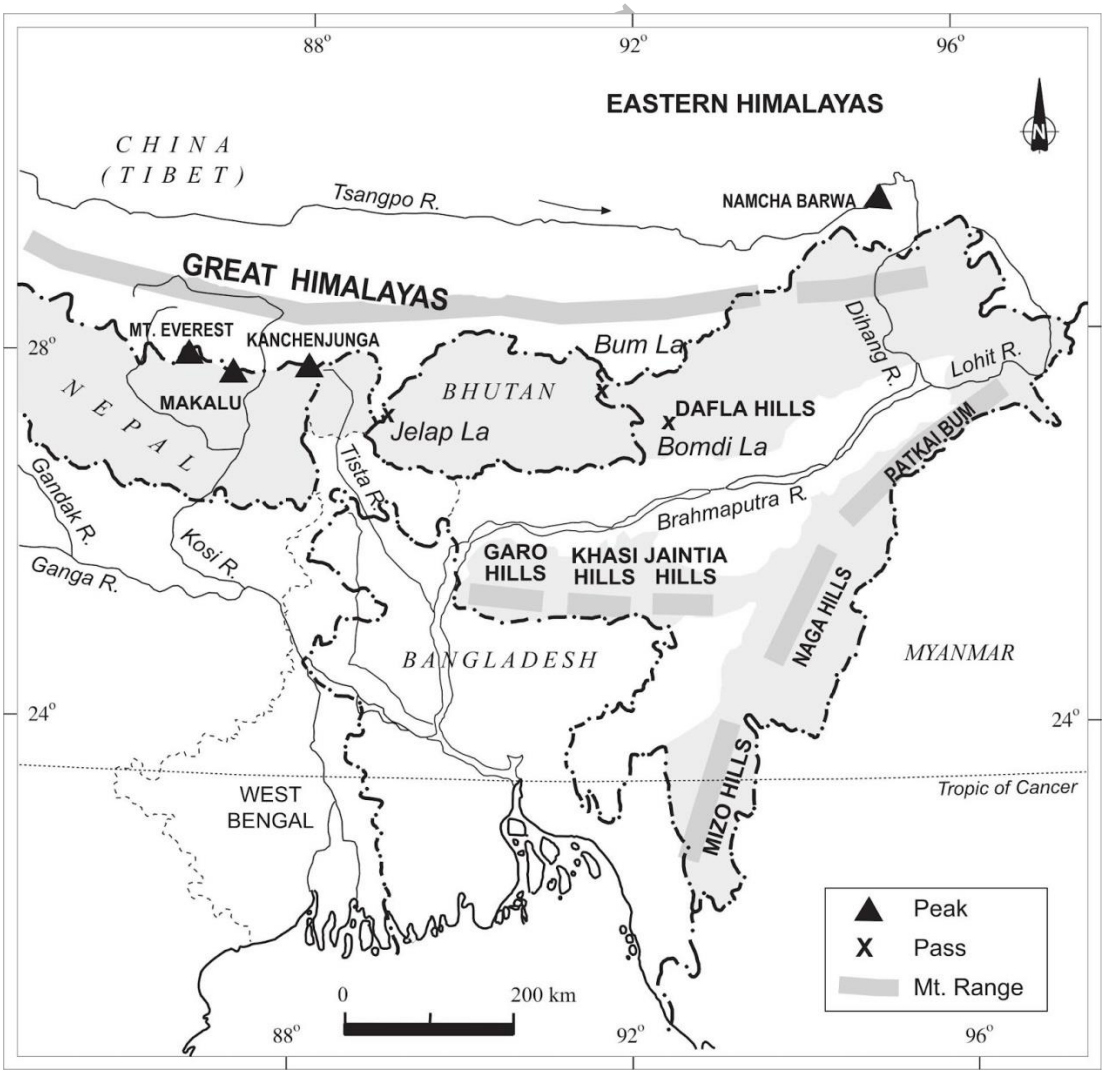
Satluj R.
Beas R.
Yamuna R.
Ganga R.
Tsangpo R.
Peak
Pass
Mt. Range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28°
24°
CHINA (TIBET)
Tsangpo R.
NAMCHA BARWA
GREAT HIMALAYAS
MT. EVEREST
KANCHENJUNGA
MAKALU
NEPAL
BHUTAN
Bum La
Jelap La
DAFLA HILLS
Bomdi La
Dihang R.
Lohit R.
PATKAI BUM
Gandak R.
Kosi R.
Ganga R.
Tista R.
Brahmaputra R.
GARO HILLS
KHASI HILLS
JAINTIA HILLS
NAGA HILLS
MIZO HILLS
BANGLADESH
MYANMAR
WEST BENGAL
Tropic of Cancer
Peak
Pass
Mt. Range
0 200 km