

Geomorphology

Interior Of The Earth

Why know about earth's interior

Sources of information about the interior

Direct Sources

Indirect Sources

What causes the magnetic field of earth?

Some sources explained in detail

High Levels of Temperature and Pressure Downwards

Evidence From The Meteorites

Seismic waves

What causes earthquakes?

Earthquake Waves

Behavior of Earthquake Waves

Primary Waves (P waves)

Secondary Waves (S waves)

Surface Waves (L waves)

Propagation of Earthquake Waves

Emergence of Shadow Zone

Why does sound wave travel faster in a denser medium
whereas light travels slower?

Why S-waves cannot travel through liquids?

Earth's Layers

Earth's Layers based on chemical properties

Earth's Layers - The Crust

Earth's Layers - Mantle

Earth's Layers - Asthenosphere

Earth's Layers - Core

Earth's Layers - Seismic Discontinuities

Earth's Chemical Composition

Composition of Earth's Crust

Earth Movements

Geomorphic processes

Endogenetic Movements

Diastrophism

Epeirogenic or continent forming movements

Orogenic or the mountain-forming movements

Sudden Movements

Earthquake

Volcanoes

Earth Movements - Exogenetic Forces

Denudation

Weathering

Chemical Weathering Processes

Biological activity and weathering

Physical Weathering Processes

Effects of Weathering

Weathering and Erosion

Significance of weathering

Continental Drift Theory - Tectonics

Introduction

Plate Tectonics

Important theories

Continental Drift Theory (Alfred Wegener, 1922)

Force for Continental Drift

Evidence in support of Continental Drift

Apparent Affinity of Physical Features

Causes of Drift

Polar wandering (Shifting of Poles)

Botanical Evidence

Rocks of Same Age Across the Oceans

Tillite deposits

Placer Deposits

Distribution of Fossils

Drawbacks of Continental Drift Theory

Convectional Current Theory - Tectonics

Mapping of the Ocean Floor

Distribution of Earthquakes and Volcanoes

Convectional Current Theory

Paleomagnetism

Paleomagnetism: Strong evidence of Sea Floor

Spreading and Plate Tectonics

Concept of Sea Floor Spreading

Evidences

Plate Tectonics

Theory

Rates of Plate Movement

Major tectonic plates

Minor tectonic plates

Force for the Plate Movement

Plate Tectonics - Interaction of Plates

Divergence forming Divergent Edge or the Constructive Edge

Convergence forming Convergent Edge or Destructive Edge

Transcurrent Edge or Conservative Edge or Transform Fault

Evidence in Support of Plate Tectonics

Significance of Plate Tectonics

Movement Of The Indian Plate

Indian Plate Boundaries

Movement

In short

Comparison: Continental Drift – Sea Floor Spreading – Plate Tectonics

Ocean - Ocean Convergence or The Island - Arc Convergence

Formation of Philippine Island Arc System

Formation of Indonesian Archipelago

Formation of Caribbean Islands

Formation of Japanese Island Arc

Explain the formation of thousands of islands in Indonesian and Philippines archipelagos

In spite of extensive volcanism, there is no island formation along the divergent boundary (mid oceanic ridge)

Continent - Ocean Convergence Or The Cordilleran Convergence

Formation of the Andes - Continent - Ocean Convergence

Formation of the Rockies - Continent - Ocean Convergence

Wadati - Benioff zone: Earthquakes along Convergent boundary

Continent - Continent Convergence or The Himalayan Convergence

Volcanism and Earthquakes in Continent - Continent Convergence

Formation of Himalayas and Tibet

Indo-Australian Plate

Indo - Australian Plate boundary

Explain the formation of Himalayas

Evidences for the rising Himalayas

Formation of Alps, Urals, Appalachians and the Atlas mountains

Why are the world's fold mountain systems located along the margins of continents? Bring out the association between the global distribution of Fold Mountains and the earthquakes and volcanoes.

Continent – Arc Convergence or New Guinea Convergence

Orogeny

Types of Mountains - Classification of Mountains

- On the basis of location
- On the basis of period of origin
- On the basis of mode of origin
- Based on the formation process

'Fault' in Geology

'Fold' in geology

Fold Mountains

- Simple fold mountains
- Complex fold mountains
- Very Old Fold Mountains
- Old Fold Mountains
- Alpine or young fold mountains
- Characteristics of Fold Mountains
- Some relevant definitions

Block Mountains

Compression and Tension

Volcanic mountains

Residual mountains

Significance of mountains

Interaction of Plates

Divergent boundary

Evolution – Formation of Rift Lakes, Seas and

Oceans

- Basic Terms
- Stage 1: Upwarping, fault zones
- Stage 2: Rift Valley Formation

Stage 3: Formation of Linear Sea or Rift Lakes

Stage 4: Linear Sea transforms into Ocean

Rift valley lakes

East African Rift Valley

Volcanism and seismicity along East African Rift Valley

Great Rift Valley

Transcurrent boundary or transform edge

Important mountain ranges

Andes

Rocky Mountains

Great Dividing Range

Transantarctic Mountains

Ural Mountains

Atlas Mountains

Appalachian Mountains

Himalayas

Alps

Mountain ranges By height

Why are world's highest mountains are at the equator?

Highest mountain peaks of the world

Volcanism

Fissure Vent

Causes of Volcanism

Lava types in Volcanism

- Andesitic or Acidic or Composite or Stratovolcanic lava
- Basic or Basaltic or Shield lava

Destructive Effects of Volcanoes

Positive Effects of Volcanoes

Geysers and Hot Springs

Distribution of Volcanoes across the World

- Pacific Ring of Fire
- Along the Atlantic coast
- Great Rift region
- The West Indian islands
- Mediterranean volcanism
- Other regions

The Distribution of Earthquakes

Volcanos in India

Extinct, Dormant and Active volcanoes

Some significant Volcanic Eruptions

- Mt. Vesuvius
- Mt. Krakatau
- Mt. Pelee

Volcanic Landforms

Extrusive Volcanic Landforms

- Conical Vent and Fissure Vent
- Mid-Ocean Ridges
- Composite Type Volcanic Landforms
- Shield Type Volcanic Landforms
- Fissure Type Flood Basalt Landforms [Lava Plateaus]
- Caldera Lake
- Cinder cone

Intrusive Volcanic Landforms

- Batholiths
- Laccoliths
- Lapolith
- Phacolith
- Sills
- Dykes

Volcanism Types – Exhalative, Effusive, Explosive and Subaqueous Volcanism

Exhalative (vapor or fumes)

Effusive (Lava outpouring)

Explosive (Violent ejection of solid material)

Volcanism – Acid Rain, Ozone Destruction

Subaqueous Volcanism

Eruptive Volcanism Types

- Hawaiian Eruption or Icelandic Eruption
- Strombolian Eruption
- Vulcanian Eruption
- Pelean Eruption
- Icelandic volcano

Hotspot Volcanism

Hot spot

Mantle plumes

Hotspot volcano chain

Hotspot volcanic landforms

Reunion Hotspot Volcanism

Distribution of Hotspot Volcanism

Earthquakes

Terms associated with earthquakes

Causes of Earthquakes

- Human Induced Earthquakes
- Volcanic Earthquakes

Seismic Waves or Earthquake Waves

Types of Seismic Waves

- Primary Waves (P waves)
- Secondary Waves (S waves)
- Surface Waves (L waves)

Earthquakes based on the depth of Focus

Distribution of Earthquakes

Effects of Earthquakes

Tsunami

What causes Tsunami?

Mechanism in Earthquake induced Tsunami's

Propagation of tsunami waves

Properties of Tsunami Waves

Waves

Normal waves vs Tsunami waves

Tsunami waves are not noticed by ships far out at sea

2004 Indian Ocean Tsunami

Plate tectonics

Tsunami waves

Occurrence

Shifts in Geography

Warning Systems

India's preparedness

Rocks – Different kinds of rocks

Igneous Rocks

Plutonic Rocks or intrusive rocks

Lava or Volcanic Rocks or Extrusive rocks

Hypabyssal or Dyke Rocks or Intermediate rocks

Acid Rocks

Basic Rocks

Economic Significance of Igneous Rocks

Sedimentary Rocks

Mechanically Formed Sedimentary Rocks

Chemically Formed Sedimentary Rocks

Organically Formed Sedimentary Rocks

Chief Characteristics of Sedimentary Rocks

Economic Significance of Sedimentary Rocks

Metamorphic Rocks

Causes of Metamorphism

Thermal Metamorphism

Dynamic Metamorphism

Some examples of Metamorphosis

Metamorphic Rocks in India

Rock cycle

Some Rock-Forming Minerals

Landforms and Cycle of Erosion

Fluvial Landforms and Cycle of Erosion

Fluvial Erosional Landforms

Various Aspects of Fluvial Erosive Action

River Valley Formation

River course

Youth

Maturity

Old Age

Waterfalls

Pot Holes

Terraces

Gulleys/Rills

Meanders

Ox-Bow Lake

Peneplane (Or peneplain)

Drainage Patterns

Dendric or Pinnate

Trellis

Rectangular

Angular

Parallel

Radial

Annular

Centripetal

Fluvial Depositional Landforms

Alluvial Fans and Cones

Natural Levees

Delta

Arcuate or Fan-shaped (Curved)

Bird's Foot Delta (Elongated)

Estuaries

Cuspate Delta

High-constructive deltas – Elongate and Lobate Delta

High-destructive deltas

Karst Landforms and Cycle of Erosion

Cavern

Arch/Natural Bridge

Sink Hole/Swallow Hole

Karst Window

Sinking Creeks/Bogas

Stalactite and Stalagmite

Marine Landforms and Cycle of Erosion

Marine Erosional Landforms

Chasms

Wave-Cut Platform

Sea Cliff

Sea Caves

Sea Arches

Stacks/Skarries/Chimney Rock

Hanging Valleys

Blow Holes or Spouting Horns

Plane of Marine Erosion/Peneplain

Marine Depositional Landforms

Beach

Bar

Barrier

Spit and Hook

Tombolos

Coastlines

Coastlines of Emergence

Coastlines of Submergence

Ria

Fjord

Dalmatian

Drowned lowland

Neutral Coastlines

Compound Coastlines

Fault Coastlines

Glacial Landforms and Cycle of Erosion

Glacial Erosional Landforms

Cirque/Corrie

Glacial Trough

Hanging Valley

Arete

Horn

D-Fjord

Glacial Depositional Landforms

Outwash Plain

Esker

Kame Terraces

Drumlin

Kettle Holes

Moraine

Glacial Cycle of Erosion

Arid Landforms and Cycle of Erosion

Erosional Arid Landforms

Water Eroded Arid Landforms

Rill

Gully

Ravine

Badland Topography

Bolsons

Playas

Pediments

Bajada

Wind Eroded Arid Landforms

Deflation basins

Mushroom rocks

Inselbergs

Demoiselles

Zeugen

Yardangs

Wind bridges and windows

Arid Depositional Landforms

Ripple Marks

Sand dunes

Longitudinal dunes

Transverse dunes

Barchans

Parabolic dunes

Star dunes

Loess

Lakes

Classification of Lakes

Temporary lakes

Permanent lakes

Fresh water lakes

Saline lakes

Lakes Formed by Earth Movement

Tectonic lakes

Rift valley lakes

Lakes Formed by Glaciation

Cirque lakes or tarns

Rock-hollow lakes

Lakes due to morainic damming of valleys

Lakes Formed by Volcanic Activity

Crater and caldera lakes

Lakes Formed by Erosion

Karst lakes

Wind-deflated lakes

Lakes Formed by Deposition

Lakes due to river deposits

Lakes due to Marine deposits

Lakes due to damming of water

Man-made lakes

Lakes and Man

Means of communication

Economic and industrial development

Water storage

Hydro-electric power generation

Agricultural purposes

Regulating river flows

Moderation of climate

Source of food

Source of minerals

Tourist attraction and health resorts

No lake is permanent over geologic time

Important Lakes on Earth

Lake Baikal [Deepest]

Lake Tanganyika [Longest]

World's Highest and Lowest Lakes

The largest lakes (surface area) by continent

Great Lakes

Shipping

Dead Sea

Aral Sea

African Great Lakes

Largest Lakes by Surface Area

Largest Lakes by Volume

Deepest Lakes in the World

Plateau

Model question on Plateaus

Plateau Formation

Thermal expansion

Crustal shortening

Volcanic Flood Basalts - Traps

Others

Plateau Types

Dissected plateau

Volcanic plateau

Others

Major plateaus of the World

Tibetan Plateau

Columbia – Snake Plateau

Colorado Plateau

Deccan Plateau

Kimberley Plateau

Katanga Plateau

Mascarene Plateau

Laurentian Plateau

Mexican Plateau

Patagonian Plateau

Altiplano Plateau or Bolivian Plateau

Massif Central

Anatolian Plateau

Others

Latitudes and Longitudes

Latitude

Important parallels of latitudes

Latitudinal Heat zones of the earth

Longitude

Longitude and Time

Standard Time and Time Zones

The International Date Line

Why is the international dateline drawn in a zigzag manner?

Indian Standard Time

Motions of the earth: Rotation and Revolution

Rotation of Earth

Why are days always longer than nights at the equator?

Why temperature falls with increasing latitude (as we move from equator towards poles)?

Revolution

Solstice

Equinox

Why regions beyond the Arctic circle receive sunlight all day long in summer?

Daylight saving in some temperate regions

Atmosphere

Role of Earth's Atmosphere

Composition of Atmosphere

Oxygen

Nitrogen

Carbon Dioxide

Ozone (O₃)

Water Vapour

Solid Particles

Major Greenhouse Gases

Carbon dioxide

Ozone

Water vapour

Methane

Structure of Atmosphere

Troposphere

Tropopause

Stratosphere

Ozonosphere

Mesosphere

Thermosphere

Ionosphere

Exosphere

Speed of sound follows temperature profile

Conditional stability: WALR < ALR < DALR

Absolute instability: ALR (at a place) < WALR

Latent Heat of Condensation

Latent Heat

Vertical Distribution of Temperature

Temperature Anomaly

Temperature Inversion

Effects of Temperature Inversion

Ideal Conditions For Temperature Inversion

Types of Temperature Inversion

Temperature Inversion in Intermontane Valley (Air Drainage Type of Inversion)

Ground Inversion (Surface Temperature Inversion)

Subsidence Inversion (Upper Surface Temperature Inversion)

Frontal Inversion (Advectional type of Temperature Inversion)

Economic Implications of Temperature Inversion

Pressure Systems

Air Pressure

Measurement of Air Pressure

Vertical Variation of Pressure

Horizontal Distribution of Pressure

Closed Isobars or Closed Pressure centers

World Distribution of Sea Level Pressure

Equatorial Low Pressure Belt or 'Doldrums'

Formation

Climate

Sub-Tropical High Pressure Belt or Horse Latitudes

Formation

Climate

Horse Latitudes

Question mains 2013: Major hot deserts in northern hemisphere are located between 20-30 degree north and on the western side of the continents. Why?

Temperature Distribution on Earth

Insolation

Ways of Transfer of Heat Energy

Factors Affecting Temperature Distribution

Latitudinal Heat Balance

Heat Budget

The Mean Annual Temperature Distribution

General characteristics of isotherms.

General Temperature Distribution

Seasonal Temperature Distribution

Seasonal Temperature Distribution – January

Seasonal Temperature Distribution – July

Lapse Rate

Why does temperature fall with elevation

Adiabatic Lapse rate

Gas law

Adiabatic Process: A Parcel of Rising or Falling Air

Adiabatic Lapse Rate in simple terms

Wet and Dry Adiabatic Lapse rate

Dry Adiabatic Lapse rate

Wet Adiabatic Lapse rate

Weather conditions at different adiabatic lapse rates

Absolute stability: ALR (at a place) > DALR

Sub-Polar Low Pressure Belt

Formation

Seasonal behavior

Climate

Polar High Pressure Belt

Formation

Climate

Pressure belts in July

Pressure belts in January

Factors Controlling Pressure Systems

Thermal Factors

Dynamic Factors

Factors affecting Wind Movement

Pressure Gradient Force and Wind Movement

Coriolis Force and Wind Movement

Why are there no tropical cyclones at the equator?

Frictional Force and Wind Movement

Centripetal Acceleration

Pressure and Wind: Geostrophic Wind

More about Coriolis effect

Causes of the Coriolis Effect

Impacts of the Coriolis Effect

Myth about Coriolis Effect

General Circulation of the Atmosphere

Hadley Cell

Ferrel Cell

Polar Cell

Walker Cell

Classification of Winds

Primary or Prevailing Winds

The Trade Winds

The Westerlies

The Polar easterlies

Secondary or Periodic Winds

Monsoons

Land Breeze and Sea Breeze

Valley Breeze and Mountain Breeze

Tertiary or Local Winds

Loo

Foehn or Fohn

Chinook

Mistral

Sirocco

Water Cycle - Hydrological Cycle

Water Vapour in Atmosphere

Significance of Atmospheric Moisture

Evaporation

Humidity

Absolute Humidity

Relative Humidity

Dew point

Specific Humidity

Evaporation

Factors Affecting Rate of Evaporation

Condensation

Processes of Cooling for Producing Condensation

Adiabatic Temperature Changes

Non-Adiabatic Temperature Changes

Forms of Condensation

Dew

White Frost

Fog

Mist

Haze

Smog

Clouds

Smog

Primary and secondary pollutants

Sulfurous smog

Photochemical smog

Haze

Effects of Smog

Question UPSC Mains 2015: Mumbai, Delhi and Kolkata are the three mega cities of the country but the air pollution is much more serious problem in Delhi as compared to the other two. Why is this so? [200 words]

Precipitation

Types of Rainfall

- Conventional Rainfall
- Orographic Rainfall
- Frontal Precipitation
- Cyclonic Rain
- Monsoonal Rainfall

World Distribution of Rainfall

Thunderstorm

How does a thunderstorm form?

Motion of a thunderstorm

Downbursts

Types of Thunderstorms

- Thermal thunderstorm
- Orographic thunderstorm
- Frontal thunderstorm
- Single-cell thunderstorm
- A multi-cell thunderstorm
- A supercell thunderstorm

Lightning and thunder

Lightening from cloud to Earth

Lightning deaths

Prediction and precautions

The world's most electric place

Deadly Strikes

Features of Lightning

Thunder

Tornado

Distribution of tornadoes

Waterspout

Damage caused by thunderstorms and tornadoes

Jet streams

Geostrophic Wind

Jet streams

- Circumpolar
- Narrow, concentrated bands
- Meandering
- Rossby Waves
- Upper Tropospheric
- High velocity
- Geostrophic streams
- Bounded by low speed winds
- Are a part of upper level westerlies

Permanent jet streams

- Subtropical jet stream (STJ)
- Polar front jet (PFJ)

Temporary jet streams

- The Tropical Easterly Jet or African Easterly Jet
- The Somali Jet

Influence of Jet Streams on Weather

Jet Streams and Weather in Temperate Regions

Jet Streams and Aviation

Air Masses

Source regions

Conditions for the formation of Air masses

Air masses based on Source Regions

Cold Air Mass

Warm Air Mass

Influence of Air Masses on World Weather

Classification of Air Masses

- Continental Polar Air Masses (CP)
- Maritime Polar Air Masses (MP)
- Continental Tropical Air Masses (CT)
- Maritime Tropical Air Masses (MT)

Fronts

Front Formation

General Characteristics of Fronts

Classification of Fronts

Stationary Front

Weather along a stationary front

Cold Front

Weather along a cold front
Cloud formation along a cold front

Warm Front

Weather along a warm front
Clouds along a warm front

Occluded Front

Weather along an occluded front
Clouds along an occluded front

Tropical Cyclones

Conditions Favourable for Tropical Cyclone

Formation

- Good Source of Latent Heat
- Coriolis Force (f)
- Low-level Disturbances
- Temperature contrast between air masses
- Upper Air Disturbance
- Wind Shear
- Upper Tropospheric Divergence
- Humidity Factor

Origin and Development of Tropical Cyclones

- Origin
- Early stage
- Mature stage

Structure of a tropical cyclone

- Eye
- Eye wall
- Spiral bands

Vertical Structure of a Tropical Cyclone

Categories of Tropical Cyclones

Favorite Breeding Grounds for Tropical Cyclones

Regional names for Tropical Cyclones

Characteristics of Tropical Cyclones

- Size and Shape
- Wind Velocity and Strength
- Path of Tropical Cyclones

Warning of Tropical Cyclones

What is a Storm Surge?

What is storm tide?

What are the disaster potential of Storm Surge?

Why do 'tropical cyclones' winds rotate counter-clockwise (clockwise) in the Northern (Southern) Hemisphere?

Why there are fewer cyclones over the Arabian Sea as compared to the Bay of Bengal?

Why there are very few Tropical Cyclones during southwest monsoon season?

What are the causes of disaster during cyclone?

- Very heavy rains causing floods.
- Strong wind
- Storm surge

Mains 2013: Naming of Cyclones

How are cyclones named in Northern Indian Ocean

Region

Why is this system of uniformity in naming a cyclone in the region

Polar or Arctic Cyclones

Maximum Sustained Wind

Low Pressure, Depression and Cyclone

Central Dense Overcast (CDO)

Annual frequency of Cyclones over the Indian Seas

States Vulnerable to Cyclones

Which sector of the cyclone experiences strongest winds?

What is the normal movement of a Tropical Cyclone?

What is the role of upper tropospheric westerly trough ?

What is 4-stage warning system for Tropical Cyclones?

Modifying cyclones?

How are Tropical Cyclones monitored by IMD?

Temperate Cyclones or Extra Tropical Cyclones or Mid-Latitude Cyclones or Frontal Cyclones

Origin and Development of Temperate Cyclones

Polar Front Theory

Seasonal Occurrence of Temperate Cyclones

Distribution of Temperate Cyclones

Characteristics of Temperate Cyclones

Size and Shape

Wind Velocity And Strength

Orientation And Movement

Structure

Associated Weather

Tropical Cyclones and Temperate Cyclones Comparison

Tropical Cyclone

Temperate Cyclone

Polar Vortex

Polar Vortex Cold Wave

How it slips

Ozone Hole [Ozone Depletion at South Pole]

Halogen atoms like chlorine destroy ozone

Polar Stratospheric Clouds (PSCs)

Nacreous clouds

El Nino

Normal Conditions

Walker circulation (Occurs during Normal Years)

During El Nino year

Effects of El Nino

How El Nino impacts monsoon rainfall in India

El Nino Southern Oscillation [ENSO]

Southern Oscillation Index and Indian Monsoons

Indian Ocean Dipole effect (Not every El Nino year is same in India)

Impact on IOD on Cyclonogenesis in Northern Indian Ocean

El Niño Modoki

El Niño Modoki Impacts

La Nina

Effects of La Nina

Koepen's scheme Of Classification Of Climate

Tropical Wet Climate (Af)

Distribution

Equatorial Climate

Temperature

Precipitation

Climate Graphs

Equatorial Vegetation

Canopy

Multiple species

Life and Economy

Agriculture

Shifting Cultivation or Slash and Burn Cultivation.

Plantation Boom

Factors Affecting the Development of Equatorial

Regions

Equatorial climate and health

Jungle hinders development

Rapid deterioration of tropical soil

Difficulties in livestock farming

Mineral resources

Tropical Monsoon Climate

Distribution of Tropical Monsoon Climate

Climate

Temperature

Precipitation

Seasons

The cool, dry season (October to February)

The hot dry season (March to mid-June)

The rainy season (mid-June to September)

The Retreating Monsoon

Climate Graph

Tropical Marine Climate

Tropical Monsoon Forests

Population and Economy in Monsoon Climate

Agricultural Development in the Monsoon Lands

Crops

Lowland cash crops

Highland plantation crops

Coffee

Tea

Lumbering

Teak

Shifting Cultivation

Savanna Climate or Tropical Wet and Dry Climate or Sudan Climate

Distribution of Savanna Climate

African Savanna

South American Savanna

Australian savanna

Indian Savanna

Savanna Climate

Rainfall

Temperature

Winds

Natural Vegetation of Savanna Climate

Animal Life of the Savanna

Life and Economy in the Savanna

Crops in Savanna

Farming

Cattle rearing

B: Desert Climate

Hot Desert Climate

Mid-Latitude Desert Climate

Desert Climate

Rainfall (Both Hot and Cold deserts)

Major hot deserts in northern hemisphere are located between 20-30 degree north and on the western side of the continents. Why?

Temperature of Hot deserts

Climatic Conditions in the Mid-Latitude deserts

Desert Vegetation

Life in the Deserts

The settled cultivators

The mining settlers

Crop cultivation and sheep rearing

Wine production

Steppe Climate or Temperate Continental Climate or Temperate Grassland Climate

Distribution

Climate

Temperature

Precipitation

Chinook: Local winds in Steppe regions

Natural Vegetation of Steppe Climate

Economic Development of Steppes

Wheat and Maize Cultivation

Ranching

Nomadic herding in Asian Steppes

Extensive mechanized wheat cultivation

Pastoral farming

Maps: Savanna Grasslands and Steppe Grasslands

Mediterranean Climate or Warm Temperate Western Margin Climate or Warm Temperate West Coast Climate

Distribution

Mediterranean Climate

A dry, warm summer with off-shore trades

Rainfall in winter with on-shore Westerlies

Climate Graphs

Local winds of the Mediterranean Climate

Sirocco

Mistral

Natural Vegetation in the Mediterranean Climate

Mediterranean evergreen forests

Evergreen coniferous trees

Mediterranean bushes and shrubs

Grass

Agriculture in the Mediterranean Climate

Orchard farming

Economy

Warm Temperate Eastern Margin Climate

China Type

Gulf Type

Natal Type

Climate

Temperature

Precipitation

Summer in Northern Hemisphere

Summer in Southern Hemisphere

Variations of Warm Temperate Eastern Margin Climate

Climate Graphs

The China type

The Gulf type

The Natal type

Natural Vegetation

Timber

Economic Development

Farming in monsoon China

Agriculture in the Gulf states

Corn

Cotton

Tobacco

Crop in Southern Hemisphere

British Type Climate

Distribution of British Type Climate

Europe

North America

Southern Hemisphere

Climate

Temperature

Precipitation

The seasons

Climate Graph British Type Climate

Natural Vegetation in British Type Climate

Economy in British Type Climate

Lumbering is quite profitable

Industrialization

Agriculture

Market gardening

Mixed farming

Dairying

Beef cattle

Sheep rearing

Other agricultural activities

Beet Sugar

Taiga Climate or Boreal Climate

Distribution

Absent in Southern Hemisphere

Taiga Climate

Temperature

Precipitation

Climate Graph of Taiga Climate

Natural Vegetation of Taiga Climate

Softwood trees

Characteristics of Coniferous forests

Economic Development of Taiga Region

Trapping

Lumbering

Factors that favor lumbering

Laurentian Climate or Cool Temperate Eastern Marine Climate

Distribution of Laurentian Climate

North American region

Asiatic region

Absent in Southern Hemisphere

Laurentian Climate

Temperature

Precipitation

The North American region

The Asiatic region

Japan

Climate Graph for Laurentian Climate

Natural Vegetation - Laurentian Climate

Lumbering

Economic Development – Laurentian Climate

Fishing off Newfoundland

Fishing off Japan

Why is fishing the dominant occupation of Japan?

Geographical advantage

Tundra Climate or Polar Climate or Arctic Climate

Distribution

Tundra Climate

Temperature

Precipitation

Natural Vegetation - Tundra Climate

Human Activities

Recent Development of the Arctic Region

Oceanography

101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200

Ocean Relief

Major Ocean Relief Features

Minor Ocean Relief Features

Continental Shelf

Continental Slope
Continental Rise
Deep Sea Plain or Abyssal Plain
Oceanic Deeps or Trenches
Mid-Oceanic Ridges or Submarine Ridges
Abyssal Hills
Submarine Canyons
Atoll
Bank, Shoal and Reef
Bank
Shoal
Reef
Significance of Study of Oceanic Relief

Marginal Seas

Marginal seas of the world

Marginal seas of the Arctic Ocean
Marginal seas of the Atlantic Ocean
Marginal seas of the Indian Ocean
Marginal seas of the Mediterranean Sea
Marginal seas of the Pacific Ocean
Other seas

Human Impact on marginal seas

Phytoplankton Bloom (Algal Bloom) in Marginal Seas

Biomass Production and Primary Productivity

Water Circulation in Marginal Seas

Black Sea and Baltic Sea
Mediterranean Sea
Gulf of Mexico

Bays, gulfs, and Straits

Bays

Guantánamo Bay

Gulfs

Straits

Choke Point

Isthmus

The Pacific Ocean

North and Central Pacific

West and South-West Pacific

South-East Pacific

The Atlantic Ocean

Continental Shelf

Mid-Atlantic Ridge

Seamounts and guyots

Trenches

The Indian Ocean

Submarine ridges

Islands

Continental Shelf

Trenches

Straits

Marginal seas

Ocean currents

Ocean Movements

Ocean currents

Primary Forces Responsible For Ocean Currents

Secondary Forces Responsible For Ocean Currents

Types of Ocean Currents

General Characteristics of Ocean Currents

Effects of Ocean Currents

Desert Formation and Ocean Currents

Temperature Distribution of Oceans

Source of Heat in Oceans

How do deep water marine organisms survive in spite of absence of sunlight?

Why is diurnal range of ocean temperatures too small?,

Why do oceans take more time to heat or cool?

The ocean water is heated by three processes.

The ocean water is cooled by

Factors Affecting Temperature Distribution of Oceans

Vertical Temperature Distribution of Oceans

Thermocline

Three-Layer System

General behavior

Horizontal Temperature Distribution of Oceans

Range of Ocean Temperature

Sunspot

Pacific Ocean Currents

Equatorial Pacific Ocean Currents

Counter equatorial current

Question Prelims 2015

Kuroshio current

Oyashio Current and Okhotsk current

North-Pacific current

Alaska and Californian current

East Australian current

Peru current or Humboldt Current

Phytoplankton and Fishing

Why are cold and warm current mixing zones the good fishing grounds? Why are tropical waters highly unproductive?

Atlantic Ocean Currents

Equatorial Atlantic Ocean Currents

Antilles current

Gulf Stream and North Atlantic Drift

Norwegian current

Sargasso Sea

Grand Banks-Richest Fishing Grounds on Earth

Brazil current

Benguela current

Indian Ocean Currents

Indian Ocean Currents and Monsoons

Winter Circulation

Summer Circulation – North Equatorial Current Counter-Equatorial Current are Absent

Southern Indian Ocean Currents - Agulhas current, Mozambique current, West Australian current

Ocean Salinity

Role of Ocean Salinity

Factors Affecting Ocean Salinity

Horizontal distribution of salinity

High salinity regions

Comparatively Low salinity regions

Pacific

Atlantic

Indian Ocean

Marginal seas

Inland seas and lakes

Cold and warm water mixing zones

Sub-Surface Salinity

Vertical Distribution of Salinity

Tides

Tidal Bulge - Why there are two tidal bulges? - Why is there a tidal bulge on the other side?

Factors Controlling the Nature and Magnitude of Tides

Types of Tides

Tides based on Frequency

- Semi-diurnal tide
- Diurnal tide
- Mixed tide

Tides based on the Sun, Moon and the Earth

Positions

- Spring tides
- Neap tides

Magnitude of tides based on Perigee and apogee of moon

Magnitude of tides based on Perigee and Apogee of earth

Ebb and Flood

Importance of Tides

- Navigation
- Fishing
- Desilting
- Other

Characteristics of Tides

Tidal bore

- Impact of Tidal Bore

Coral Reefs

Coral Reef Relief Features

- Fringing Reefs (Shore Reefs)
- Barrier Reefs
- Atolls

Development Of Major Coral Reef Types

- Formation Of Lakshadweep Islands [You must include the concept of Hotspot]

Ideal Conditions for Coral Growth

- Distribution of Coral Reefs
- Corals and Zooxanthellae
- Symbiotic Relationship Between Corals And ZOOXANTHELLAE

Coral Bleaching or Coral Reef Bleaching

Ecological Causes of Coral Bleaching

- Temperature
- Sub aerial Exposure
- Fresh Water Dilution
- Inorganic Nutrients
- Xenobiotics
- Epizootics

Spatial and temporal range of coral reef bleaching

Resources from the Ocean

Ocean Deposits

- Terrigenous Deposits
- Pelagic Deposits

Mineral Resources

- Mineral deposits found on continental shelves and slopes
- Mineral deposits found on deep sea floor

Energy Resources

Fresh Water

Biotic Resources

Jurisdiction over the Seas

United Nations International Conferences on the

Law of the Sea

- Territorial waters
- Contiguous Zone or Pursuit Zone
- Exclusive Economic Zone (EEZ)
- High Seas

Law of the Sea and Marine Pollution

- Convention on Dumping of Wastes at Sea

Sea Level Change

The major categories of change in sea level

Importance of understanding Sea Level Changes

Evidence in Support of Sea Level Change

Depositional Activity

New rivers and more alluvium

Features of Indo – Gangetic – Brahmaputra Plain

Geomorphological features of Indo – Gangetic – Brahmaputra Plain

- The Bhabar
- The Terai
- The Bhangar
- The Khadar
- Reh or Kollar

Regional Divisions of the Great Plains

- Sindh Plain [Pakistan]
- Rajasthan Plain
- Punjab Plain
- Ganga Plain
- Ganga-Brahmaputra Delta
- Brahmaputra Plain

Significance of the Plain

Peninsular Plateau

Features of the Peninsular Plateau

Minor Plateaus in the Peninsular Plateau

- Marwar Plateau or Mewar Plateau
- Central Highland
- Bundelkhand Upland
- Malwa Plateau
- Baghelkhand
- Chotanagpur Plateau
- Meghalaya Plateau
- Deccan Plateau
- Maharashtra Plateau
- Karnataka Plateau
- Telangana plateau
- Chhattisgarh Plain

Hill Ranges of the Peninsular Plateau

Aravali Range

Vindhyan Range

Satpura Range

Western Ghats (or The Sahyadris)

- The northern section
- The Middle Sahyadri
- The southern section

Eastern Ghats

Significance of the Peninsular Plateau

Coastline of India – Indian Coastline

East Coast of India

Regional Names of The East Coast of India

West Coast of India

Regional Names of The West Coast of India

Coastlines

Coastlines of Emergence and Submergence

Western Coastal Plains of India

- Kutch and Kathiawar region
- Gujarat Plain
- Konkan Plain
- Karnataka Coastal Plain
- Kerala Plain

Eastern Coastal Plains of India

- Utkal Plain
- Andhra Plain
- Tamil Nadu Plain

Significance of the Coastal Plains

Indian Islands

Andaman and Nicobar islands

Lakshadweep Islands

New Moore Island

Drainage patterns

- Drainage basin
- Drainage Divide

Some important drainage basins across the world
Difference between a River Basin and a Watershed

Discordant drainage patterns

Antecedent Drainage or Inconsequent Drainage

Superimposed or Epigenetic (Discordant) or

Superinduced Drainage

Concordant Drainage Patterns

Consequent Rivers

Subsequent Rivers

Dendritic or Pinnate Drainage Pattern

Trellis Drainage Pattern

Angular Drainage Pattern

Rectangular Drainage Pattern

Radial Drainage Pattern

Annular Drainage Pattern

Parallel Drainage Pattern

Centripetal Drainage Pattern

Deranged Drainage Pattern

Barbed Drainage Pattern

Contribution of Water by Various Rivers

Classification of Drainage Systems of India

Drainage Systems Based on the Size of the Catchment Area

Drainage Systems Based on Origin

Drainage Systems Based on the Type of Drainage

Drainage Systems Based on Orientation to the sea

Lop sided distribution

Major River System or Drainage Systems in India

Himalayan River systems

Peninsular River Systems

West Flowing Peninsular River Systems

Indus River System

Indus River

Major Tributaries of Indus River

Jhelum River

Chenab River

Ravi River

Beas River

Satluj River

Indus water treaty

Ganga River System

Ganga River

Ganga – Brahmaputra Delta

Right Bank Tributaries of The Ganga

Yamuna River

Chambal River

The Banas

The Sind

The Betwa

The Ken

The Son

Damodar river

Left Bank Tributaries of The Ganga River

Ramganga River

Ghaghra River

Kali River

Gandak River

Burhi Gandak

Kosi River

Brahmaputra River System

Peninsular River System or Peninsular Drainage

Evolution of the Peninsular Drainage

Theory 1

Theory 2

Peninsular River Systems

Himalayan River System vs. Peninsular River System

East Flowing Peninsular Rivers

Mahanadi River

Tributaries of Mahanadi River
Projects on Mahanadi River
Industry in Mahanadi River Basin
Floods in Mahanadi River Basin

Godavari River

Tributaries of Godavari River
Mineral Resources in Godavari Basin
Projects on Godavari River
Industry in Godavari Basin
Floods and Droughts in Godavari Basin

Krishna River

Tributaries of Krishna River
Projects on Krishna River
Resources in Krishna Basin
Industry in Krishna Basin
Drought and Floods in Krishna Basin

Cauvery River

Tributaries of the Cauvery River
Floods in Cauvery Basin
Projects on Cauvery River
Industry in Cauvery Basin

Pennar River

Tributaries of Pennar River
Projects on Pennar River
Industry in Pennar Basin

Subarnarekha

Brahamani River

Sarada River

Ponnaiyar River

Vaigai River

West Flowing Rivers of The Peninsular India

Estuary

Narmada River

Tributaries of Narmada River

Tapti River

Tributaries of Tapti River
Projects on Tapti River
Industry in the Tapti Basin

Sabarmati River

Industry in Sabarmati Basin

Mahi River

Luni River

West flowing Rivers of the Sahyadris (Western Ghats)

Ghaggar River – Inland Drainage

Usability of Rivers

Indian Monsoons

Factors responsible for south-west monsoon formation
Factors that influence the onset of south-west monsoons
Factors that influence the intensity of south-west monsoons
Factors responsible for north-east monsoon formation

Mechanism of Indian Monsoons

Indian Monsoons – Classical Theory: Sir Edmund Halley's Theory

Indian Monsoons – Modern theory: Air Mass Theory

Indian Monsoons – Role of ITCZ [Inter-Tropical Convergence Zone]

Indian Monsoon Mechanism – Jet Stream Theory

How Jet Streams Affect Weather?

Indian Monsoon Mechanism – Role of Sub-Tropical Jet Stream (STJ)

STJ – Sub-Tropical Jet Stream

Seasonal Migration of Sub-Tropical Jet Stream – STJ

Sub-Tropical Jet Stream – STJ in Winter

Western Disturbances

Why no south-west monsoons during winter?

Sub-Tropical Jet Stream – STJ in Summer

Why no south-west monsoons in March – May
(summer)?

Indian Monsoons – Role of Tropical Easterly Jet (TEJ)

[African Easterly Jet]

Tropical Easterly Jet (TEJ)

Indian Monsoons – Role of Tibet

Indian Monsoons – Role of Somali Jet

Indian Monsoons – Role of Indian Ocean Dipole

How Jet Streams affect the Monsoons in the Indian Sub-Continent?

Projects to understand monsoons

ISMEX

MONEX

Western Disturbances

Weather associated with Western Disturbances

Importance of Western Disturbances

Cloudburst in Jammu and Kashmir, Himachal Pradesh, Uttarakhand

Indian Climate

Features of Indian Climate

Rainfall

Temperature

Factors Influencing Indian Climate

Latitudinal location

Distance from the Sea

Himalayas

Physiography

Monsoon Winds

Upper Air Circulation

Tropical Cyclones and Western Disturbances

El-Nino, La Nina and ENSO

Indian Climate – Seasons

Winter Season in India

Temperature in Winter Season

Pressure in Winter Season

Western Disturbances in Winter Season

Tropical Cyclones in Winter Season

Precipitation in Winter Season

Summer Season in India

Temperature in Summer Season

Pressure in Summer Season

Winds in Summer Season

Frontal Thunderstorms in Summer Season

Norwesters and Thunderstorms in Summer Season

Convictional Thunderstorms in Summer Season

Western Disturbances in Summer Season

Tropical Cyclones in Summer Season

Precipitation in Summer Season

Rainy Season – South West Monsoon Season

Temperature during South West Monsoon Season

Pressure and Winds During South West Monsoon
Season

Rainfall During South West Monsoon Season

South West Monsoon – Arabian Sea branch and Bay of
Bengal branch

Break in the South West Monsoons

Depressions in South West Monsoon Season

Advance and Withdrawal of South West Monsoons

Chief Characteristics of South West Monsoon Rainfall

North East Monsoon Season – Retreating Monsoon Season

Temperature during Retreating Monsoon Season

Pressure and Winds during Retreating Monsoon Season

Cyclones during Retreating Monsoon Season

Precipitation during Retreating Monsoon Season

Annual Rainfall [South West Monsoons + Retreating Monsoons]

Areas of very high rainfall

Areas of high rainfall

Areas of low rainfall

Areas of very low rainfall

Climatic Regions of India

Stamp's Classification of Climatic Regions of India

Koepen's Classification of Climatic Regions of India

Natural Vegetation of India

Classification Of Natural Vegetation of India

Moist Tropical Forests

Tropical Wet Evergreen Forests or Rain Forests

Tropical Semi-Evergreen Forests

Tropical Moist Deciduous Forests

Littoral and Swamp Forests

Dry Tropical Forests

Tropical Dry Evergreen Forests

Casuarina plantation

Tropical Dry Deciduous Forests

Tropical Thorn Forests

Montane Sub-Tropical Forests

Sub-tropical Broad-leaved Hill Forests

Sub-tropical Moist Pine Forests

Sub-tropical Dry Evergreen Forests

Montane Temperate Forests

Montane Wet Temperate Forests

Himalayan Moist Temperate Forests

Himalayan Dry Temperate Forests

Alpine Forests

Soil

Soil Types – Sandy-Clayey-Loamy

Soil Profile – Soil Horizon

O Horizon

A Horizon or Surface soil

E horizon

B Horizon or Subsoil

C Horizon or Parent rock

R Horizon or Bedrock

Parent Material

Ancient crystalline and metamorphic rocks

Cuddapah and Vindhyan rocks

Gondwana rocks

Deccan basalts

Tertiary and Mesozoic sedimentary rocks

Relief

Climate

Natural Vegetation

Major Soil Groups of India

Alluvial Soils

Characteristics of Alluvial Soils

Chemical properties of Alluvial Soils

Distribution of Alluvial Soils in India

Crops in Alluvial Soils

Geological divisions of alluvial soils

Black Soils

Characteristics of Black Soils

Colour of Black Soils

Chemical Composition of Black Soils

Distribution of Black Soils

Crops in Black Soils

Red Soils

Characteristics of Red Soils

Chemical Composition of Red Soils

Color of Red Soils

Distribution of Red Soils

Crops in Red Soils

Laterite – Lateritic Soils

Chemical composition of Laterite – Lateritic Soils

Distribution of Laterite – Lateritic Soils

Crops in Laterite – Lateritic Soils

Economic value of Laterite – Lateritic Soils

Forest – Mountain Soils

Distribution of Forest – Mountain Soils
Chemical properties of Forest – Mountain Soils
Crops in Forest – Mountain Soils

Arid – Desert Soils

Distribution of Arid – Desert Soils
Chemical properties of Arid – Desert Soils
Crops of Arid – Desert Soils

Saline – Alkaline Soils

Capillary action
Surface tension
What gives water droplet its shape?
Distribution of Saline – Alkaline Soils

Peaty – Marshy Soils

Distribution of Peaty – Marshy Soils
Chemical Properties of Peaty – Marshy Soils
Crops of Peaty – Marshy Soils

Characteristics of Indian Soils

Problems Of Indian Soils

Soil Degradation

Soil Erosion

Water Erosion
Wind Erosion
Extent Of Soil Erosion In India
Factors affecting Soil Erosion
Effects of Soil Erosion

Deforestation

Major Causes of Deforestation
Effects of Deforestation

Overgrazing

Faulty Methods of Agriculture

Soil Salinity and Soil Alkalinity

Effects of salinity and alkalinity
Steps to treat salinity and alkalinity

Desertification

Ecological implications of desertification
Measures of Controlling Desertification

Waterlogging

Soil Conservation

Crop Rotation

Strip Cropping

Use of Early Maturing Varieties

Contour Ploughing

Checking Shifting Cultivation

Ploughing the Land in Right Direction

Mulching

Contour barriers

Rock dam

Terrace farming

Contour Bunding

Intercropping

Contour ploughing

Shelter belts or Windbreaks

Sand fences

Afforestation

Checking Overgrazing

Dams

Economic Geography

Iron Ore

Commonly found impurities in Iron Ore

Silicon
Sulphur
Phosphorous
Lead

Manganese

Tin

Oxygen

What exactly happens in a blast furnace?

Inputs in to blast furnace

Beneficiation = Improve Concentration of Iron

Why coke and not coal in smelting?

Role of limestone = Remove Sulphur

Reduction = Remove Oxygen

Pig Iron

Cast iron

Steel

Stainless steel

Wrought iron

Types of Iron Ore

Haematite

Magnetite

Limonite

Siderite

Factors that determine the location of Iron and steel industry

Iron Ore Distribution Across the World

Iron Ore in China – Manchuria, Sinkiang, Si-kiang, Shandog Peninsula

Iron Ore in Europe – Ruhr, South Whales, Krivoy Rog, Bilbao, Lorraine

Iron ore in Africa – Transvaal, Liberia

Iron ore in Russia, Kazakhstan – Ural region, Magnitogorsk

Iron Ore in North America – Great Lakes [Mesabi Region], Labrador

Iron Ore in South America – Carajas, Itabira, Minas Gerais

Iron Ore in Australia – Pilbara Region, Koolyanobbing, Iron Duke, Iron Knob

Iron Ore Distribution in India

Iron Ore in Orissa

Iron Ore in Chhattisgarh

Iron Ore in Jharkhand

Iron Ore in Karnataka

Iron ore in other states

Coal

Formation of Coal

Types of Coal – Peat, Lignite, Bituminous & Anthracite Coal

Peat

Lignite

Bituminous Coal

Anthracite Coal

Distribution of Coal in India

Gondwana Coal

Distribution of Gondwana Coal in India

Gondwana Coalfields in Chhattisgarh

Gondwana Coalfields in Jharkhand

Gondwana Coalfields in Odisha

Gondwana Coalfields in Madhya Pradesh

Gondwana Coalfields in Andhra Pradesh

Gondwana Coalfields in Maharashtra

Gondwana Coalfields in West Bengal

Gondwana Coalfields in Uttar Pradesh

Tertiary Coal

Tertiary Coalfields in Assam

Tertiary Coalfields in Arunachal Pradesh

Tertiary Coalfields in Meghalaya

Tertiary Coalfields in Jammu and Kashmir, Himachal Pradesh

Tertiary Coal – Lignite

Lignite in Tamil Nadu

Lignite in Gujarat and Rajasthan

Tertiary Coal – Peat

Problems of Coal Mining in India

Coking Coal vs. Non-Coking Coal

Coal Reserves in India by State

Coal Production in India by State

Coking Coal Production by State

Non Coking Coal Production By State

Total Coal Production By State

India's Coal Imports and Exports

Major Coalfields in India

Distribution of Coal across the World

Global Coal Reserves

Top Producers and Consumers of Coal in the World

Distribution of Coal in USA

Distribution of Coal in China

Petroleum and Mineral Oil

Constituents of Petroleum and Mineral Oil

Formation of Petroleum and Mineral Oil

Distribution of Petroleum and Mineral Oil in India

Extent of Oil Bearing Strata in India

On-shore Oil Production In India

Assam Oilfields

Gujarat Oilfields

Rajasthan Oilfields

Off-Shore Production in India

Western Coast

Eastern Coast

Petroleum Refining

Advantages of Pipeline

Disadvantages of Pipelines

Crude Oil Pipelines

Petroleum Product Pipelines

Share of Oil in Power Generation

India's Oil Imports

Petroleum and Mineral Oil - World distribution

Supergiants

Oilfields in Saudi Arabia

Oil Fields in Iraq, Kuwait, & Iran

Oil Fields in Russia

Oil Fields in United States, Mexico, & Canada

Oilfields in Venezuela & Brazil

Oilfields in United Kingdom

Oilfields in African Region

Natural gas

Natural Gas Formation

Uses of Natural Gas

Importance of Natural Gas to India

World Distribution of Natural Gas

Natural Gas in Russia

Natural Gas in Europe

Natural Gas in North America

Natural Gas in Africa

Natural Gas in Middle East

Natural Gas in Asia

OPEC – Organization of Petroleum Exporting Countries

Distribution of Natural Gas in India

Petroleum and Gas Value Chain

Upstream Sector

Midstream sector

Downstream sector

Unconventional Gas Reservoirs

Coalbed Methane

Coalbed Methane in India

Problems in Exploration, Extraction of Coalbed Methane in India

Shale Gas – Shale Gas Formation

Shale Gas Reserves Across the World

Shale Gas Reserves in India

Extraction of Shale Gas

Hydro-fracturing or Fracking

Guar gum

Problems Associated With Shale Gas Exploitation

Solutions

Shale Gas Extraction Issues in India - If US can then why can't India?

Shale Gas: Low Potential, High Risk and there is a Better Alternative

Bauxite

Bauxite Distribution in India

Odisha

Chhattisgarh

Maharashtra

Jharkhand

Gujarat

Bauxite Distribution – World

Lead and Zinc

Lead

Zinc

Distribution of Lead and Zinc ores - India and World

Tungsten

Distribution of Wolfram

Pyrites

Gold Reserves in India

Karnataka

Andhra Pradesh

Jharkhand

Kerala

Gold Distribution Across the World

Countries with highest gold deposits

Major Gold Producing Countries

Silver Distribution – India & World

Manganese

Manganese Ore Distribution in India

State wise reserves of Manganese

Maharashtra

Madhya Pradesh

Odisha

Andhra Pradesh

Karnataka

Other producers

Export of Manganese

World Manganese Ore Distribution

Chromite

Chromite Ore Distribution In India

Chromite in Odisha

Chromite in Other States

Chromite Ore Distribution Across the World

Copper

Copper Reserves in India

Madhya Pradesh

Rajasthan

Jharkhand

Major Copper Reserves Across the World

Nickel

Graphite

Applications of Graphite

Major Producers of Graphite – India & World

Total Indian Graphite Resources
Operational Indian Graphite Resources
Graphite Production Across the World

Diamonds

Diamonds in India

Diamonds Across the World

Differences Between Graphite and Diamond

Non-Metallic Minerals

Mica

Mica Reserves in India
Mica Distribution and Production in India
Mica Exports

Limestone

Dolomite

Asbestos

Magnesite

Kyanite

Sillimanite

Gypsum

Salt

Conservation of Mineral Resources

Nuclear fission

How Nuclear Fission Releases Energy?

Common Fissile Material

Uranium Enrichment

Nuclear Reactor

Nuclear Reactor Coolant
Neutron Moderator
Control Rods or Reactivity control
Critical mass
Criticality
Neutron poison

Types of Nuclear Reactors

**Thermal Reactors and Fast Neutron Reactors
[Breeder Reactors]**

Reactors based on Coolant and Moderator

Light-water reactor (LWR)

Pressurized Water Reactor (PWR)
Boiling Water Reactor (BWR)
Supercritical Water Reactor (SCWR)

Pressurized Heavy-Water Reactor (PHWR)

Nuclear proliferation and PHWR

Atomic Minerals

Uranium

Distribution of Uranium Across the World
List of Countries by Uranium Reserves and Production
Uranium in India
Nuclear Power Plants in India

Thorium

Monazite – Rare Earth Metals
Advantages of Thorium
Thorium Distribution

India's Three-Stage Nuclear Power Programme

Stage I – Pressurized Heavy Water Reactor [PHWR]

Stage II – Fast Breeder Reactor

Stage III – Thorium Based Reactors

Prototype Fast Breeder Reactor at Kalpakkam

**What Hinders Deployment of Thorium-Fuelled
Reactors In India?**

What is a fissile material?

**Present State of India's Three-Stage Nuclear Power
Programme**

**Solution to India's Fissile Shortage Problem –
Procuring Fissile Material Plutonium**

Favourable Conditions for Plutonium Trade