

NOTES ON INDIAN GEOGRAPHY

Point. Precise. Powerful.



To our Hardworking and persistence aspirants

“Success is going from failure to failure without losing enthusiasm.”

Winston Churchill

ACKNOWLEDGEMENTS

The amount of personal investment it takes to make notes, especially for the first time something like this, is tremendous. For us, years of personal experience and education accumulated until one day we realized that we had something to say. The process of turning our opinions and experience into a published volume has been a long one.

Second only to my family, I would like to acknowledge the unique culture of my family that allows an individual like me the freedom to pursue the life I want to live. Although it's rarely celebrated in our society and hardly taught in our schools.

We still have many miles to go together and I look forward to sharing them all with you.

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Thanks also to the many other smart, motivated, creative, and supportive friends and associates who have helped us along the way.

5. *The southernmost point of the Indian Union— 'Indira Point' got submerged under the sea water in 2004 during the Tsunami.*

SIZE

1. An area of 3.28 million square km.
2. ***India's total area accounts for about 2.4 per cent of the total geographical area of the world.***
3. India is the ***seventh largest country*** of the world.
4. **India has a land boundary of about 15,200 km**
5. ***The total length of the coast line of the mainland including Andaman and Nicobar and Lakshadweep is 7,516.6 km.***
6. India is bounded by the young fold mountains in the northwest, north and north east.
7. From Gujarat to Arunachal Pradesh there is a time lag of two hours.
8. Hence, time along the ***Standard Meridian of India (82°30'E) passing through Mirzapur*** (in Uttar Pradesh) is taken as the standard time for the whole country.
9. ***Rajasthan is the largest state***
10. ***Goa is the smallest state in terms of area.***
11. No other country has a long coastline on the Indian Ocean as India has and indeed, it is India's eminent position in the Indian Ocean which justifies the naming of an Ocean after it.
12. **Since the opening of the Suez Canal in 1869, India's distance from Europe has been reduced by 7,000 km.**

Do you know?

1. The USA and Canada have six time zones extending from the Pacific coast to the Atlantic coast.
2. The ***local time changes by four minutes for every one degree*** of longitude.
3. The ***local time of longitude of 82°30' E*** has been taken as the Indian Standard Time.

INDIA'S NEIGHBOURS

1. **There are *seven countries that share land boundaries* with India**
2. Across the sea to the south, lie our ***island neighbours— Sri Lanka and Maldives.***
3. **Sri Lanka is separated from India by the Palk Strait.**

India shares its land boundaries with

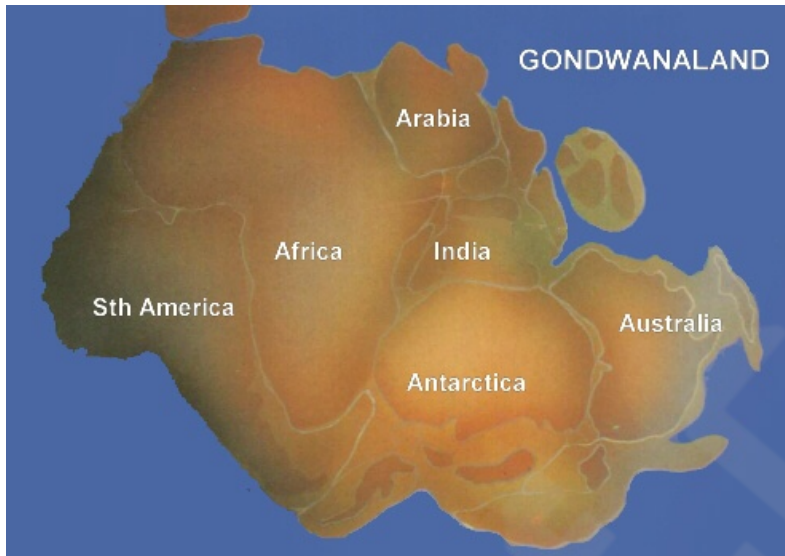
1. **Pakistan**
2. **Afghanistan**
3. **China (Tibet)**
4. **Nepal**
5. **Bhutan**
6. **Myanmar**
7. **Bangladesh**

Two island countries

1. Sri Lanka
2. Maldives

PHYSICAL FEATURES OF INDIA

1. Most volcanoes and earthquakes in the world are located at plate margins, but some do occur within the plates.
2. The **oldest landmass, (the Peninsula part of India), was a part of the Gondwana land.**
3. **The Gondwanaland included India, Australia, South Africa and South America as one single land mass.**



4. The convectional currents split the crust into a number of pieces.
5. This leads to the drifting of the Indo-Australian plate after being separated from the Gondwana land, towards north.
6. The northward drift resulted in the collision of the plate with the much larger Eurasian Plate
7. Due to this collision, the sedimentary rocks which were accumulated in the geosynclines known as the Tethys were folded to form the mountain system of western Asia and Himalaya.



What is Gondwanaland?

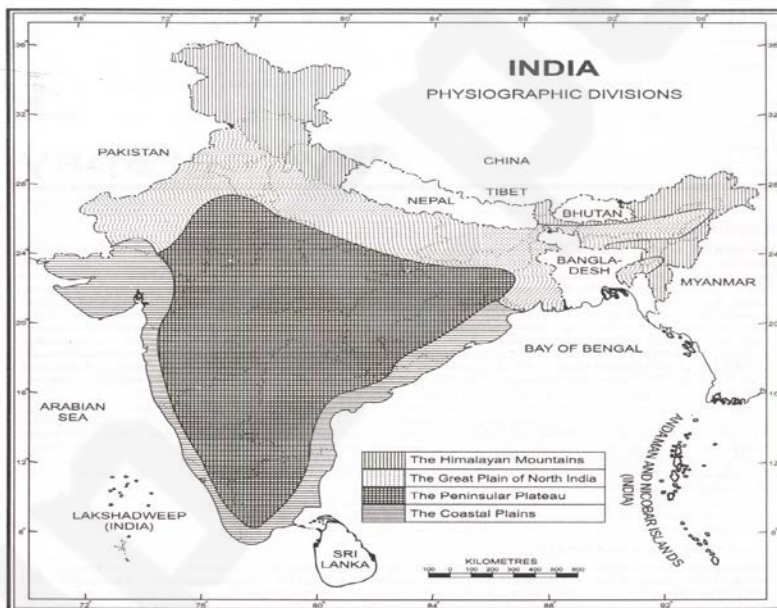
1. **It is the southern part of the ancient super continent Pangea with Angara Land in the northern part.**
2. The Himalayan uplift out of the Tethys Sea and subsidence of the northern flank of the peninsular plateau resulted in the formation of a large basin.
3. In due course of time this depression, gradually got filled with deposition of sediments by the rivers flowing from the mountains in the north and the peninsular plateau in the south.
4. A flat land of extensive alluvial deposits led to the formation of the northern plains of India.

5. Geologically, the ***Peninsular Plateau constitutes one of the ancient landmasses*** on the earth's surface.

PHYSIOGRAPHIC DIVISION OF INDIA

India can be divided into six physiographic regions.

- 1) The Northern Mountains (The North and North-eastern Mountains)
- 2) The Peninsular Plateau
- 3) Indo Gangetic Plains
- 4 Indian Deserts
- 5) The Coastal Plains (East & West)
- 6) Island



1) The Northern Mountains (The North and North-eastern Mountains)

1. The Himalayas consist of a series of parallel mountain ranges.
2. The general orientation of these ranges is *from northwest to the southeast direction in the north-western part of India*
3. Himalayas in the Darjeeling and Sikkim regions lie in an east west direction
4. While in Arunachal Pradesh they are from southwest to the northwest direction
5. In Nagaland, Manipur and Mizoram, they are in the north south direction
6. The approximate length of the Great Himalayan range, also known as the central axial range, is 2,500 km from east to west
7. Their width varies between 160-400 km from north to south.
8. Himalayas are not only the physical barrier; they are also a climatic, drainage and cultural divide.

On the basis of relief, alignment of ranges and other geomorphologic features the

Himalayas can be divided into the following sub-divisions

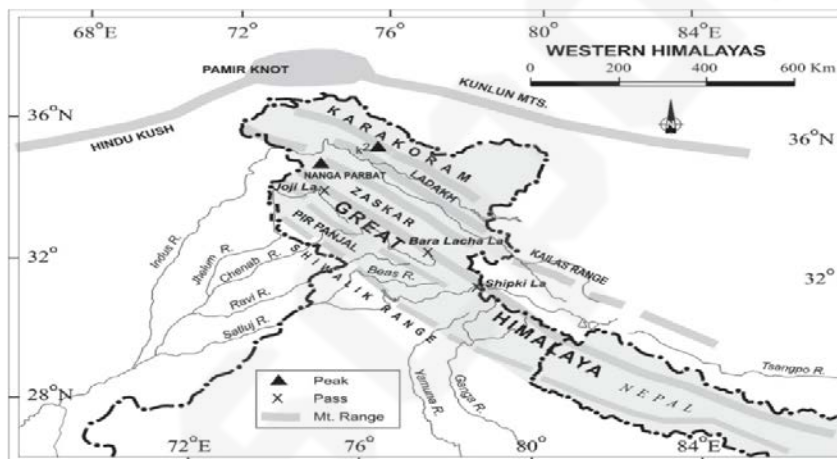
- (i) Kashmir or North-western Himalayas
- (ii) Himachal and Uttaranchal Himalayas
- (iii) Darjeeling and Sikkim Himalayas
- (iv) Arunachal Himalayas
- (v) Eastern Hills and Mountains

(i) Kashmir or North-western Himalayas

Comprise a series of ranges such as

1. Karakoram
2. Ladakh
3. Zaskar
4. Pir Panjal

Figure (1) - Western Himalaya



1. The north-eastern part of the Kashmir Himalayas is a cold desert, which lies between the *Greater Himalayas and the Karakoram ranges*
2. Great Himalayas and the Pir Panjal range, lies the world famous *valley of Kashmir and the famous Dal Lake*.
3. The Kashmir Himalayas are also famous for *Karewa formations*, which are useful for the cultivation of Zafran, a local variety of saffron.
4. This region is drained by the river Indus, and its tributaries such as the Jhelum and the Chenab.

5. The Kashmir and north-western Himalayas are well-known for their scenic beauty and picturesque landscape
6. Famous places of pilgrimage such as Vaishno Devi, Amarnath Cave, Charar -e-Sharif, etc. are also located here and large number of pilgrims visit these places every year
7. Srinagar, capital city of the state of Jammu and Kashmir is located on the banks of Jhelum River.
8. Srinagar, capital city of the state of Jammu and Kashmir is located on the banks of Jhelum River.
9. An Interesting Fact
10. In Kashmir Valley, the meanders in Jhelum River are caused by the local base level provided by the erstwhile larger lake of which the present Dal Lake is a small part.
11. The Himachal and Uttaranchal Himalayas
12. This part lies approximately between the Ravi in the west and the Kali (a tributary of Ghaghara) in the east
13. It is drained by two major river systems of India, i.e. the Indus and the Ganga.
14. Tributaries of the Indus include the river Ravi, the Beas and the Satluj
15. The tributaries of Ganga flowing through this region include the Yamuna and the Ghaghara.
16. The northernmost part of the Himachal Himalayas is an extension of the Ladakh cold

Some Important facts of this region

KAREWAS

KAREWAS ARE THE THICK DEPOSITS OF GLACIAL CLAY AND OTHER MATERIALS EMBEDDED WITH MORAINES.

Important passes of the region are

1. Zoji La on the Great Himalayas
2. Banihal on the Pir Panjal
3. Photu La on the Zaskar
4. Khardung La on the Ladakh range.

Important fresh lakes

1. Dal
2. Wular

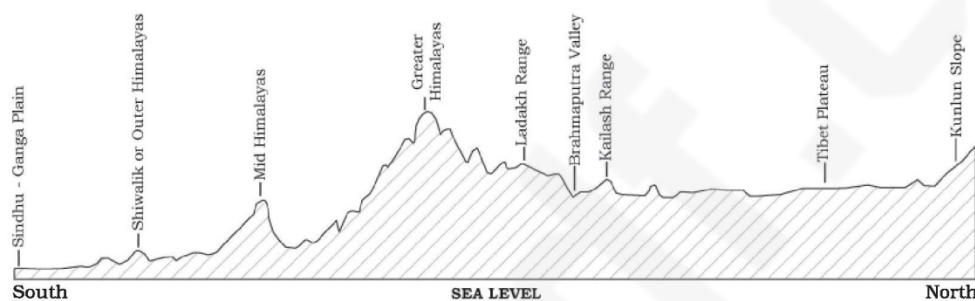
Salt water lakes such as

1. Pangong Tso
2. Tso Moriri

‘Valley of flowers’

1. The famous ‘Valley of flowers’ is also situated in this region.
2. *The places of pilgrimage* such as the Gangotri, Yamunotri, Kedarnath, Badrinath and Hemkund Sahib are also situated in this part.
3. The region is also known to have five famous Prayags (river confluences)

(ii) Himachal and Uttarakhand Himalayas



Great Himalaya or Himadri

1. Northern most range is known as the Great or Inner Himalayas or the 'Himadri'.
2. **'Himadri'. It is the most continuous range** consisting of the loftiest peaks with an average height of 6,000 metres.
3. The folds of Great Himalayas are **asymmetrical in nature.**
4. The core of this part of Himalayas is **composed of granite.**

It is perennially snow bound, and a number of glaciers descend from this range. The Himalayan Mountains are divided into three main parallel ranges.

Bhotia's

1. In the Great Himalayan range, the valleys are mostly inhabited by the Bhotia's.
2. These are nomadic groups who migrate to 'Bugyals' (the summer grasslands in the higher reaches) during summer months and return to the valleys during winters.

Himachal or lesser Himalaya

1. The range lying to the south of the Himadri forms the most rugged mountain system and is known as Himachal or lesser Himalaya.
2. The altitude varies between 3,700 and 4,500 metres and the average width is of 50 Km.
3. The Pir Panjal range forms the longest and the most important range
4. The Dhauladhar and the Mahabharat ranges are also prominent ones.
5. This range consists of the famous valley of Kashmir, the Kangra and Kullu Valley in Himachal Pradesh.
6. This region is well known for its hill stations

Shiwaliks

1. The outer most range of the Himalayas is called the Shiwaliks.
2. They extend over a width of 10-50 Km and have an altitude varying between 900 and 1100 metres.
3. These ranges are composed of unconsolidated sediments brought down by rivers from the main Himalayan ranges located farther north.
4. Covered with thick gravel called Alluvium.
5. The longitudinal valley lying between lesser Himalaya and the Shiwaliks are known as Duns.
6. Dehra Dun, Kotli Dun and Patli Dun are some of the well-known Duns.
7. The word shiwalik has its origin in the geological formation found in and around a place called Sivawala near Dehra Dun
8. Which was once a headquarter of the Imperial Survey and which subsequently established its permanent headquarters at Dehra Dun.
9. Dehra Dun is the largest of all the duns with an approximate length of 35-45 km and a width of 22-25 km.

Some of the important hill stations

1. *Dharamshala*
2. *Mussoorie*
3. *Shimla*
4. *Kaosani*

The cantonment towns and health resorts

1. *Shimla*
2. *Mussoorie*
3. *Kasauli*
4. *Almora*
5. *Lansdowne*
6. *Ranikhet*

The two distinguishing features of this region

1. *The 'Shiwalik*
2. *'Dun formations'*

Some important duns

1. Chandigarh-Kalka dun
2. Nalagarh dun
3. Dehra Dun
4. Harike dun
5. The Kota dun

(iii) The Darjeeling and Sikkim Himalayas

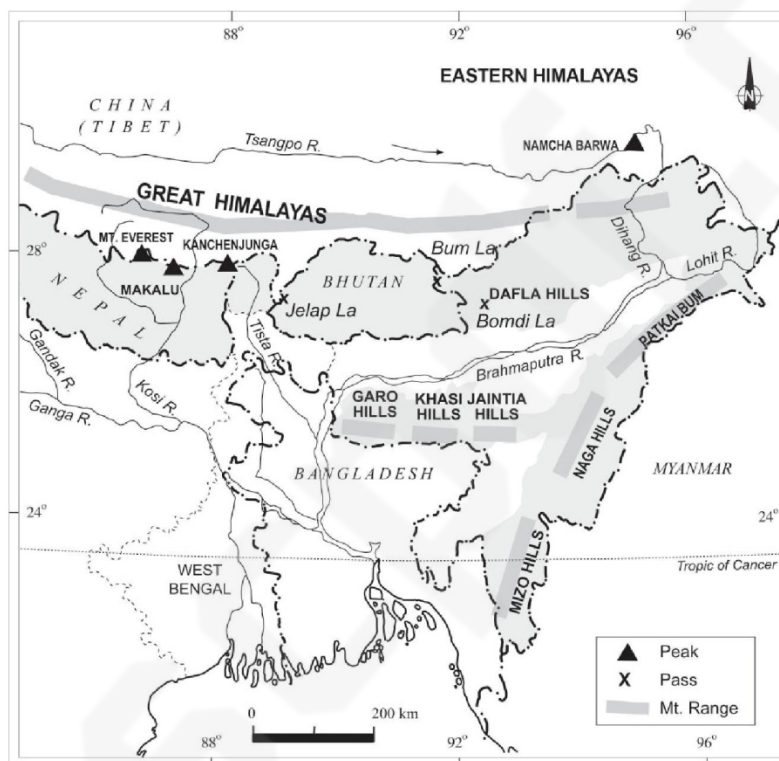
1. They are flanked by Nepal Himalayas in the west and Bhutan Himalayas in the east.
2. It is relatively small but is a most significant part
3. Known for its fast-flowing Rivers such as Tista
4. It is a region of high mountain peaks like *Kanchenjunga (Kanchengiri)*, and deep valleys.
5. The higher reaches of this region are *inhabited by Lepcha tribes* while *the southern part, particularly the Darjiling Himalayas, has a mixed population of Nepalis, Bengalis and tribals from Central India.*
6. The British, taking advantage of the physical conditions such as
 - Moderate slope
 - Thick soil cover
 - High organic content
 - Well distributed rainfall throughout the year
 - And mild winters,
7. Introduced tea plantations
8. In place of the Shiwaliks here, the '*duar formations*' are important
9. Which have also been used for the development of tea gardens

(iv) The Arunachal Himalayas

1. These extend from the east of the Bhutan Himalayas up to the Diphu pass in the east.
2. The general direction of the mountain range is from southwest to northeast.
3. Some of the important mountain peaks of the region are Kangtu and Namcha Barwa.
4. These ranges are dissected by fast-flowing rivers from the north to the south, forming deep gorges.
5. Bhramaputra flows through a deep gorge after crossing Namcha Barwa.
6. Some of the important rivers are
 - The Kameng
 - Subansiri
 - The Dihang
 - The Dibang
 - The Lohit.
7. An important aspect of the Arunachal Himalayas is the numerous ethnic tribal community inhabiting in these areas.
8. Some of the prominent ones from west to east are
 - The Monpa
 - Daffla
 - Abor
 - Mishmi
 - Nishi
 - The Nagas
9. Most of these communities practise Jhumming.

(v) The Eastern Hills and Mountains

1. These are part of the Himalayan mountain system having their general alignment from the north to the south direction
2. They are known by different local names
3. In the north, they are known as Pataki Bum, Naga Hills,
4. In the south as Mizo or Lushai hills.
5. Most of these ranges are separated from each other by numerous small rivers.
6. The Barak is an important river in Manipur and Mizoram.
7. The physiography of Manipur is unique by the presence of a large lake known as 'Loktak' lake at the centre, surrounded by mountains from all sides.
8. Mizoram which is also known as the 'Molassis basin' which is made up of soft unconsolidated deposits.
9. Most of the rivers in Nagaland form the tributary of the Brahmaputra.
10. While two rivers of Mizoram and Manipur are the tributaries of the Barak River, which in turn is the tributary of Meghna;



Some Highest Peaks of the Himalayas

Peak	Country	Height in metres
Mt. Everest	Nepal	8848
Kanchenjunga	India	8598
Makalu	Nepal	848
Dhaulagiri	Nepal	8172

Nanga Parbat	India	8126
Annapurna	Nepal	8078
Nanda Devi	India	7817
Kamet	India	7756
Namcha Barwa	India	775
Gurla Mandhata	Nepal	7728

THE HIMALAYAS AND OTHER PENINSULAR MOUNTAINS

1. The Himalayas along with other peninsular mountains are young, weak and flexible in their geological structure
2. They are still subjected to the interplay of exogenic and endogenic forces,
3. Resulting in the development of faults, folds and thrust plains.
4. These mountains are tectonic in origin, dissected by fast-flowing rivers which are in their youthful stage.
5. Various landforms like (are indicative of these stages)
 - a) Gorges
 - b) V-shaped valleys
 - c) Rapids
 - d) Waterfalls

2) The Peninsular Plateau

1. Rising from the height of 150 m above the river plains up to an elevation of 600-900 m is the irregular triangle known as the peninsular plateau.
2. Delhi ridge in the northwest, (extension of **Aravalis**), the **Rajmahal hills** in the east, **Gir range** in the west and the Cardamom hills in the south constitute the outer extent
3. An extension of this is also seen in the northeast, in the form of **Shillong and Karbi-Anglong plateau**
4. This is one of the oldest and the most stable landmass of India.
5. The general elevation of the plateau is from the west to the east
6. This is also proved by the pattern of the flow of rivers.
7. Some of the important physiographic features of this region **are tors, block mountains rift valleys, spurs, bare rocky structures**, series of hummocky hills and wall-like quartzite dykes

On the basis of the prominent relief features, the peninsular plateau can be divided into three broad groups:

- (i) The Deccan Plateau
- (ii) The Central Highlands

(iii) The Northeastern Plateau

The Deccan Plateau

1. This is bordered by the Western Ghats in the west.
2. Eastern Ghats in the east and the Satpura.
3. Maikal range and Mahadeo hills in the north.
4. Western Ghats are locally known by different names such as ***Sahyadri in Maharashtra, Nilgiri hills in Karnataka and Tamil Nadu and Anaimalai hills and Cardamom hills in Kerala.***
5. Western Ghats are comparatively higher in elevation and more continuous than the Eastern Ghats.
6. Their average elevation is about 1,500 m with the height increasing from north to south.
7. '**Anaimudi (2,695 m), the highest peak**' of Peninsular plateau is located on the Anaimalai hills of the Western Ghats.
8. Most of the Peninsular rivers have their origin in the Western Ghats.
9. **Eastern Ghats** comprising the **discontinuous and low hills** are highly eroded by the rivers such as the **Mahanadi, the Godavari, the Krishna, and the Kaveri.**
10. Some of the **important ranges** include the **Javadi hills, the Palconda range, the Nallamala hills, the Mahendragiri hills**
11. The Eastern and the Western Ghats meet each other at the Nilgiri hills.

The Central Highlands

1. They are bounded to the west by the Aravali range.
2. The Satpura range is formed by a series of scarped plateaus on the south.
3. Generally at an elevation varying between 600-900 m above the mean sea level.
4. It is a classic example of the relict mountains which are highly denuded and form discontinuous ranges.
5. The **extension of the peninsular** plateau can be seen as far as Jaisalmer in the West.
6. The general elevation of the Central Highlands ranges between 700-1,000 m above the mean sea level.
7. It slopes towards the north and north-eastern directions.
8. Most of the tributaries of the river Yamuna have their origin in the Vindhyan and Kaimur ranges.
9. **Banas is the only significant tributary of the river Chambal** that originates from the Aravalli in the west.

The North-eastern Plateau

1. It is an extension of the main peninsular plateau.
2. Due to the force exerted by the **north-eastward movement** of the Indian plate at the time of the Himalayan origin, a huge fault was created between the Rajmahal hills and the Meghalaya plateau.
3. Later, this depression got filled up by the deposition activity of the numerous rivers.
4. Today, the Meghalaya and Karbi Anglong plateau stand detached from the main Peninsular Block.
5. The **Meghalaya plateau is further sub-divided into three**: Named after the tribal groups inhabiting this region.

- (i) The Garo Hills
- (ii) The Khasi Hills

(iii) The Jaintia Hills

6. An extension of this is also seen in the **Karbi Anglong hills of Assam**.
7. The Meghalaya plateau is also **rich in mineral resources like coal, iron ore, sillimanite, limestone and uranium**.
8. This area receives maximum rainfall from the south west monsoon.
9. The Meghalaya plateau has a **highly eroded surface**.
10. Cherrapunji displays a bare rocky surface devoid of any permanent vegetation cover.

Some quick facts

1. The northern boundary of the Peninsular Block may be taken as an irregular line running from Kachchh along the western flank of the Aravali Range near Delhi and then roughly parallel to the Yamuna and the Ganga as far as the Rajmahal Hills and the Ganga delta.
2. The north-eastern parts are separated by the Malda fault in West Bengal from the Chotanagpur plateau.
3. The Peninsula is formed essentially by a great complex of very ancient gneisses and granites,
4. Since the Cambrian period, the Peninsula has been standing like a rigid block
5. As a part of the Indo-Australian Plate, it has been subjected to various vertical movements and block faulting.
6. The rift valleys of the Narmada, the Tapi and the Mahanadi and the Satpura block mountains are some examples of it.
7. The river valleys here are shallow with low gradients
8. **Aravali hills, one of the oldest ranges of the world**
9. The **Vindhyas and the Satpuras** are the important ranges.
10. The rivers **Narmada and Tapi flow through these ranges**.
11. These are **west-flowing rivers** that drain into the Arabian Sea.
12. Western Ghats are almost continuous,
13. The Eastern Ghats are broken and uneven
14. The plateau is rich in minerals like coal and iron-ore.
15. The western coastal plains are very narrow
16. The eastern Coastal plains are much broader
17. There are a **number of east flowing rivers**. The **rivers Mahanadi, Godavari, Krishna and Kaveri** drain into the Bay of Bengal.
18. These rivers have formed fertile deltas at their mouth.

The Peninsula mostly consists of relict and residual mountains like

1. The Aravali hills
2. The Nallamala hills
3. The Javadi hills
4. The Veliconda hills
5. Palkonda range
6. The Mahendragiri hills

3) INDO GANGETIC PLAINS

1. The *third geological division of India* comprises the plains formed by the river Indus, the Ganga and the Brahmaputra.
2. It was a geo-synclinal depression which attained its maximum development
3. During the third phase of the Himalayan mountain formation approximately about 64 million years ago.
4. Since then, it has been gradually filled by the sediments brought by the Himalayan and Peninsular rivers.
5. Average depth of alluvial deposits in these plains ranges from 1,000-2,000 m.

The Northern Plain

1. Formed by the interplay of the three major river systems, namely– the Indus, the Ganga and the Brahmaputra
2. Formed of alluvial soil
3. It spreads over an area of 7 lakh sq. km.
4. The plain being about 2400 Km long and 240 to 320 Km broad, is a densely populated physiographic division
5. The velocity of the river decreases which results in the formation of riverine islands
6. Majuli, in the Brahmaputra River is the largest inhabited riverine island in the world.
7. The rivers in their lower course split into numerous channels due to the deposition of silt
8. These channels are known as distributaries
9. The Northern Plain is broadly divided into three sections.
10. The Western part of the Northern Plain is referred to as the Punjab Plains. Formed by the Indus and its tributaries, the larger part of this plain lies in Pakistan.
11. The Indus and its tributaries–the Jhelum, the Chenab, the Ravi, the Beas and the Satluj originate in the Himalaya. This section of the plain is dominated by the doabs.
12. 'Doab' is made up of two words- 'do' meaning two and 'ab' meaning water
13. 'Punjab' is also made up two words- 'Punj' meaning five and 'ab' meaning water.
14. The Ganga plain extends between Ghaggar and Teesta rivers.
15. It is spread over the states of North India, Haryana, Delhi, U.P., Bihar, partly Jharkhand and West Bengal to its East, particularly in Assam lies the Brahmaputra plain.

From the north to the south these plains can be divided into three major zones -

Bhabar

1. The rivers, after descending from the mountains deposit pebbles in a narrow belt of about 8 to 16 km in width lying parallel to the slopes of the Shiwaliks.
2. As a result of this, the streams and rivers coming from the mountains deposit heavy materials of rocks and boulders.
3. All the streams disappear in this bhabar belt.

Terai

1. South of this belt, the streams and rivers re-emerge and create a wet, swampy and marshy region
2. This was a thickly forested region full of wildlife
3. The forests have been cleared to create agricultural land and to settle migrants from Pakistan after partition.

Alluvial Plains

1. The alluvial plains can be further divided into Khadar, Kankar and the Bhangar

Bhangar

1. The largest part of the northern plain is formed of older alluvium. They lie above the flood plains of the rivers and present a terrace like feature.

Kankar

1. The soil in this region contains calcareous deposits

Khadar

1. The newer, younger deposits of the flood plains
2. They are renewed almost every year and so are fertile, thus, ideal for intensive agriculture.

4) The Indian Desert

1. The Indian desert lies towards the western margins of the Aravali Hills.
2. It is a land of undulating topography dotted with longitudinal dunes and barchans.
3. Receives very low rainfall below 150 mm per year.
4. Arid climate with low vegetating cover.
5. This is also known as Marusthali.
6. Due to extreme arid conditions, its surface features have been carved by physical weathering and wind actions .
7. Some of the well pronounced desert land features present here are mushroom rocks, shifting dunes and oasis (mostly in its southern part).
8. Most of the rivers in this region are ***ephemeral***.
9. There are some streams which disappear after flowing for some distance and present a typical case of ***inland drainage by joining a lake or playa***.
10. The lakes and the playas have brackish water which is the main source of obtaining salt.
11. **Luni is the only large river in this region**
12. On the basis of the orientation, the desert can be divided into two parts
13. The northern part is sloping towards Sindh and the southern towards the Rann of Kachchh.

<u>Barchans (crescent shaped dunes)</u>
Cover larger areas but longitudinal dunes become more prominent near the Indo-Pakistan boundary.

5) The Coastal Plains (east & west)

- Peninsular plateau is flanked by stretch of narrow coastal strips, running along the Arabian Sea on the west and the Bay of Bengal on the east.
- **Lakshadweep Islands are located in the Arabian Sea.**
- **These are coral islands** located off the coast of Kerala.
- The **Andaman and the Nicobar Islands** lie to the southeast of the Indian **mainland in the Bay of Bengal.**

The western coast

1. Sandwiched between the Western Ghats and the Arabian Sea, is a narrow plain. It consists of three sections.
2. The northern part of the coast is called the Konkan (Mumbai – Goa),
3. The central stretch is called the Kannad Plain
4. The southern stretch is referred to as the Malabar Coast.

The plain along the Bay of Bengal are wide and level

Northern Circar

- In the northern part, it is referred to as the Northern Circar

Coromandal Coast

- The southern part is known as the Coromandal Coast.
- Large rivers such as the Mahanadi, the Godavari, the Krishna and the Kaveri have formed extensive delta on this coast.
- Lake Chilika is an important feature along the eastern coast
- *The Chilika Lake is the largest salt water lake in India. It lies in the state of Orissa, to the south of the Mahanadi delta.*

6) The Islands

1. The country has also two groups of islands.
2. Lakshadweep Islands group lying close to the Malabar coast of Kerala
3. This group of islands is composed of small coral islands.
4. It covers small area of 32 sq. km.
5. Kavaratti Island is the administrative headquarters of Lakshadweep.
6. This island group has great diversity of flora and fauna.
7. The Pitli Island, which is uninhabited, has a bird sanctuary

Corals

1. Coral polyps are short-lived microscopic organisms, which live in colonies
2. They flourish in shallow, mud free and warm waters.
3. They secrete hard rock like substance
4. The coral secretion and their skeletons form coral deposits in the form of reefs:
5. They are mainly of three kinds
 - Barrier reef
 - Fringing reef
 - Atolls
6. The Great Barrier Reef of Australia is a good example of the first kind of coral reefs. Atolls are circular or horse shoe shaped coral reefs

Andaman and Nicobar islands

1. Elongated chain of islands located in the Bay of Bengal extending from north to south
2. They are bigger in size and are more numerous and scattered.
3. Divided into two broad categories
 - The Andaman in the north
 - The Nicobar in the south

4. It is believed that these islands are an elevated portion of submarine mountains.
5. These islands lie close to equator and experience equatorial climate and have thick forest cover.
6. *India's only active volcano is found on Barren Island* in Andaman and Nicobar group of Islands.
7. Each region complements the other and makes the country richer in its natural resources.

Conclusion -

The northern mountains are the major sources of water and forest wealth.
The northern plains are the granaries of the country.
The plateau is a storehouse of minerals, which has played a crucial role in the industrialisation of the country.
The coastal region and island groups provide sites for fishing and port activities.

CLIMATE

- Refers to the sum total of weather conditions and variations over a large area for a long period of time (more than thirty years).

Weather

- Refers to the state of the atmosphere over an area at any point of time.
- The elements of weather and climate are the same, i.e. temperature, atmospheric pressure, wind, humidity and precipitation.
- The word *monsoon* is derived from the Arabic word '*mausim*' which literally means season.
- Monsoon' refers to the seasonal reversal in the wind direction during a year.
- The climate of India is described as the 'monsoon' type
- This type of climate is found mainly in the south and the Southeast Asia
- In the Thar Desert the day temperature may rise to 50°C, and drop down to near 15°C the same night.
- There is hardly any difference in day and night temperatures in the Andaman and Nicobar islands or in Kerala.

CLIMATIC CONTROLS

1. There are six major controls of the climate of any place
 - Latitude
 - Altitude
 - Pressure
 - Wind system
 - Distance from the sea
 - Ocean currents and relief features.

Latitude

- Due to the curvature of the earth, the amount of solar energy received varies according to latitude

Altitudes

- As one goes from the surface of the earth to higher altitudes, the atmosphere becomes less dense and temperature decreases. The hills are therefore cooler during summers.

Pressure and wind

- The pressure and wind system of any area depend on the latitude and altitude of the place. Thus it influences the temperature and rainfall pattern.

Distance from the sea

- The sea exerts a moderating influence on climate: As the distance from the sea increases, its moderating influence decreases and the people experience extreme weather conditions. This condition is known as continentality (i.e. very hot during summers and very cold during winters).

Ocean currents

- Ocean currents along with onshore winds affect the climate of the coastal areas, For example, any coastal area with warm or cold currents flowing past it, will be warmed or cooled if the winds are onshore.

Relief

- Plays a major role in determining the climate of a place. High mountains act as barriers for cold or hot winds; they may also cause precipitation if they are high enough and lie in the path of rain-bearing winds. The leeward side of mountains remains dry.

FACTORS AFFECTING INDIA'S CLIMATE

Latitude

1. The Tropic of Cancer passes through the middle of the country from the Rann of Kutch in the west to Mizoram in the east
2. Almost half of the country, lying south of the Tropic of Cancer, belongs to the tropical area
3. All the remaining area, north of the Tropic, lies in the sub-tropics.
4. Therefore, India's climate has characteristics of tropical as well as subtropical climates.

Altitude

1. India has mountains to the north, which have an average height of about 6,000 metres.
2. India also has a vast coastal area where the maximum elevation is about 30 metres.
3. The Himalayas prevent the cold winds from Central Asia from entering the subcontinent.
4. It is because of these mountains that this subcontinent experiences comparatively milder winters as compared to central Asia.

Pressure and Winds

1. The climate and associated weather conditions in India are governed by the following atmospheric conditions:
 - Pressure and surface winds;
 - Upper air circulation;
 - Western cyclonic disturbances and tropical cyclones.
2. India lies in the region of north easterly winds.
3. These winds originate from the subtropical high-pressure belt of the northern hemisphere.
4. They blow south, get deflected to the right due to the Coriolis force, and move on towards the equatorial low-pressure area.
5. Generally, these winds carry very little moisture as they originate and blow over land.
6. Therefore, they bring little or no rain. Hence, India should have been an arid land, but, it is not so

Coriolis force

An apparent force caused by the earth's rotation. The Coriolis force is responsible for deflecting winds towards the right in the northern hemisphere and towards the left in the southern hemisphere. This is also known as 'Ferrel's Law'.

7. During winter, there is a high-pressure area north of the Himalayas.
8. Cold dry winds blow from this region to the low-pressure areas over the oceans to the south.
9. In summer, a low-pressure area develops over interior Asia as well as over north-western India.

10. This causes a complete reversal of the direction of winds during summer.
11. Air moves from the high-pressure area over the southern Indian Ocean, in a south-easterly direction, crosses the equator,
12. Turns right towards the low-pressure areas over the Indian subcontinent.
13. These are known as the Southwest Monsoon winds.
14. These winds blow over the warm oceans, gather moisture and bring widespread rainfall over the mainland of India.

Jet stream

1. The upper air circulation in this region is dominated by a westerly flow. An important component of this flow is the jet stream
2. These jet streams are located approximately over 27°-30° north latitude, therefore, they are known as subtropical westerly jet streams
3. Over India, these jet streams blow south of the Himalayas, all through the year except in summer.
4. The western cyclonic disturbances experienced in the north and north-western parts of the country are brought in by this westerly flow.
5. In summer, the subtropical westerly jet stream moves north of the Himalayas with the apparent movement of the sun.

Tropical easterly

An easterly jet stream, called the tropical easterly Jetstream blows over peninsular India, approximately over 14°N during the summer months.

Jet stream

These are a narrow belt of high altitude (above 12,000 m) westerly winds in the troposphere. Their speed varies from about 110 km/h in summer to about 184 km/h in winter. A number of separate jet streams have been identified. The most constant are the mid-latitude and the sub-tropical jet stream.

Western Cyclonic Disturbances

1. The western cyclonic disturbances are weather phenomena of the winter months brought in by the westerly flow from the Mediterranean region.
2. They usually influence the weather of the north and north-western regions of India
3. Tropical cyclones occur during the monsoon as well as in October -November, and are part of the easterly flow.
4. These disturbances affect the coastal regions of the country.

THE INDIAN MONSOON

1. The monsoons are experienced in the tropical area roughly between 20° N and 20° S.
2. To understand the mechanism of the monsoons, the following facts are important.
 - The differential heating and cooling of land and water creates low pressure on the landmass of India while the seas around experience comparatively high pressure.
 - (b) The shift of the position of Inter Tropical Convergence Zone (ITCZ) in summer, over the Ganga plain (this is the equatorial trough normally positioned about 5°N of the equator – also known as the monsoon trough during the monsoon season).

- (c) The presence of the high-pressure area, east of Madagascar, approximately at 20°S over the Indian Ocean. The intensity and position of this high-pressure area affects the Indian Monsoon.
- (d) The Tibetan plateau gets intensely heated during summer, which results in strong vertical air currents and the formation of high pressure over the plateau at about 9 km above sea level.
- (e) The movement of the westerly jet stream to the north of the Himalayas and the presence of the tropical easterly jet stream over the Indian peninsula during summer.

Inter Tropical Convergence Zone

1. The Inter Tropical Convergence Zone (ITCZ,) is a broad trough of low pressure in equatorial latitudes.
2. This is where the northeast and the southeast trade winds converge.
3. This convergence zone lies more or less parallel to the equator but moves north or south with the apparent movement of the sun.
4. Changes in the pressure conditions over the southern oceans also affect the monsoons.

Southern Oscillation or SO

1. Normally when the tropical eastern South Pacific Ocean experiences high pressure, the tropical eastern Indian Ocean experiences low pressure.
2. But in certain years, there is a reversal in the pressure conditions and the eastern Pacific has lower pressure in comparison to the eastern Indian Ocean.
3. If the pressure differences were negative, it would mean below average and late monsoons.

El Nino

1. A feature connected with the SO is the El Nino, a warm ocean current that flows past the Peruvian Coast
2. In place of the cold Peruvian current, every 2 to 5 years.

ENSO (El Nino Southern Oscillations)

- The changes in pressure conditions are connected to the El Nino. Hence, the phenomenon is referred to as ENSO

El Nino

1. This is a name given to the periodic development of a warm ocean current along the coast of Peru
2. It occurs when easterly trade winds in the tropical pacific relax- even reverse- to allow a vast pool of warm water piled up in of central and South America, leading to higher- than- normal sea- surface temperatures across the equatorial Pacific.
3. As a temporary replacement of the cold Peruvian current
4. El Nino' is a Spanish word meaning 'the child',
5. Refers to the baby Christ, as this current starts flowing during Christmas
6. As the ocean releases its heat and moisture to the atmosphere, intense thunderstorms once cooped up over the western pacific spread along the equator as well.
7. The presence of the El Nino leads to an increase in sea-surface temperatures and weakening of the trade winds in the region
8. The cumulative effect of this activity changes large scale circulation patterns at higher latitudes, altering storm tracks that change the typical distribution of rain and snowfall, as well seasonal temperatures.

THE ONSET OF THE MONSOON AND WITHDRAWAL

1. The Monsoon, unlike the trades, are not steady winds but are pulsating in nature, affected by different atmospheric conditions encountered by it
2. The duration of the monsoon is between 100-120 days from early June to mid-September.

'Burst 'of the monsoon,

- Around the time of its arrival, the normal rainfall increases suddenly and continues constantly for several days. This is known as the 'burst 'of the monsoon
3. The monsoon arrives at the southern tip of the Indian peninsula generally by the first week of June.
 4. Subsequently, it divides into two – the Arabian Sea branch and the Bay of Bengal branch.
 5. The Arabian Sea branch reaches Mumbai about ten days later on approximately the 10 Th of June.
 6. The Bay of Bengal branch also advances rapidly and arrives in Assam in the first week of June.
 7. The lofty mountains causes the monsoon winds to deflect towards the west
 8. Over the Ganga plains
 9. By mid-June the Arabian Sea branch of the monsoon arrives over Saurashtra-Kuchchh and the central part of the country.
 10. The Arabian Sea and the Bay of Bengal branches of the monsoon merge over the north-western part of the Ganga plains.
 11. Delhi generally receives the monsoon showers from the Bay of Bengal branch by the end of June (tentative date is 29 Th of June).
 12. By the first week of July, western Uttar Pradesh, Punjab, Haryana and eastern Rajasthan experience the monsoon.
 13. By mid-July, the monsoon reaches Himachal Pradesh and the rest of the country
 14. The withdrawal of the monsoon begins in north-western states of India by early September.
 15. By mid-October, it withdraws completely from the northern half of the peninsula.
 16. The withdrawal from the southern half of the peninsula is fairly rapid
 17. By early December, the monsoon has withdrawn from the rest of the country.
 18. The islands receive the very first monsoon showers, progressively from south to north,
 19. From the first week of April to the first week of May.
 20. The withdrawal, takes place progressively from north to south from the first week of December to the first week of January.

THE SEASONS

1. The monsoon type of climate is characterised by a distinct seasonal pattern.
2. The weather conditions greatly change from one season to the other.
3. Any seasons are experienced in your place? Four main seasons can be identified in India –
 - The cold weather season,
 - The hot weather season
 - The advancing monsoon
 - The retreating monsoon

The Cold Weather Season (winter)

1. The cold weather season begins from mid-November in northern India and stays till February.
2. December and January are the coldest months in the northern part of India.
3. The northeast trade winds prevail over the country.
4. They blow from land to sea and hence, for most part of the country, it is a dry season.

5. Some amount of rainfall occurs on the Tamil Nadu coast from these winds as, here they blow from sea to land.
6. In the northern part of the country, a feeble high-pressure region develops, with light winds moving outwards from this area.
7. Influenced by the relief, these winds blow through the Ganga valley from the west and the northwest.
8. The weather is normally marked by clear sky, low temperatures and low humidity and feeble, variable winds.
9. A characteristic feature of the cold weather season over the northern plains is the inflow of cyclonic disturbances from the west and the northwest.
10. These low-pressure systems, originate over the Mediterranean Sea and western Asia and move into India, Along with the westerly flow.

'Mahawat

They cause the much-needed winter rains over the plains and snowfall in the mountains. Although the total amount of winter rainfall locally known as 'mahawat' is small, they are of immense importance for the cultivation of 'rabi' crops

The Hot Weather Season (summer)

1. Due to the apparent northward movement of the sun, the global heat belt shifts northward.
2. In March, the highest temperature is about 38° Celsius, recorded on the Deccan plateau.
3. In April, temperatures in Gujarat and Madhya Pradesh are around 42° Celsius.
4. In May, temperature of 45° Celsius is common in the north-western parts of the country
5. In peninsular India, temperatures remain lower due to the moderating influence of the oceans.

'Loo'

These are strong, gusty, hot, dry winds blowing during the day over the north and north-western India.

1. Sometimes they even continue until late in the evening
2. Direct exposure to these winds may even prove to be fatal

'Kaal Baisakhi'

In West Bengal, these storms are known as the 'Kaal Baisakhi' calamity for the month of Baisakh

Advancing Monsoon (The Rainy Season)

1. By early June, the low-pressure condition over the northern plains intensifies.
2. It attracts, the trade winds of the southern hemisphere.
3. These south-east trade winds originate over the warm subtropical areas of the southern oceans. They cross the equator
4. Blow in a south-westerly direction entering the Indian peninsula as the south-west monsoon.
5. As these winds blow over warm oceans, they bring abundant moisture to the subcontinent.
6. These winds are strong and blow at an average velocity of 30 km per hour.
7. Early in the season, the windward side of the Western Ghats receives very heavy rainfall, more than 250 cm

8. The Deccan Plateau and parts of Madhya Pradesh also receive some amount of rain in spite of lying in the rain shadow area.
9. The maximum rainfall of this season is received in the north-eastern part of the country.
10. Mawsynram in the southern ranges of the Khasi Hills receives the highest average rainfall in the world.
11. Rainfall in the Ganga valley decreases from the east to the west.
12. Rajasthan and parts of Gujarat get scanty rainfall.
13. Phenomenon associated with the monsoon is its tendency to have 'breaks' in rainfall.
14. It has wet and dry spells.
15. The monsoon rains take place only for a few days at a time.
16. These breaks in monsoon are related to the movement of the monsoon trough.
17. The trough and its axis keep on moving northward or southward
18. When the axis of the monsoon trough lies over the plains, rainfall is good in these parts
19. Whenever the axis shifts closer to the Himalayas, there are longer dry spells in the plains,
20. Widespread rain occur in the mountainous catchment areas of the Himalayan Rivers.
21. These heavy rain bring in their wake, devastating floods causing damage to life and property in the plains.
22. The frequency and intensity of tropical depressions too, determine the amount and duration of monsoon rains.
23. These depressions form at the head of the Bay of Bengal and cross over to the mainland.
24. The depressions follow the axis of the "monsoon trough of low pressure".
25. The monsoon is known for its uncertainties.
26. The alternation of dry and wet spells vary in intensity, frequency and duration.

Retreating Monsoon (The Transition Season)

1. During October-November, with the apparent movement of the sun towards the south,
2. The monsoon trough or the low-pressure trough over the northern plains becomes weaker.
3. Gradually replaced by a high-pressure system.
4. The south-west monsoon winds weaken and start withdrawing gradually
5. By the beginning of October, the monsoon withdraws from the Northern Plains.
6. The months of October-November form a period of transition from hot rainy season to dry winter conditions.
7. Mawsynram, the wettest place on the earth is also reputed for its stalagmite and stalactite caves.

Cyclonic depressions

1. The low-pressure conditions, over north-western India
2. Get transferred to the Bay of Bengal by early November.
3. This shift is associated with the occurrence of cyclonic depressions,
4. Which originate over the Andaman Sea.
5. These cyclones generally cross the eastern coasts of India cause heavy and widespread rain.
6. These tropical cyclones are often very destructive.
7. Deltas of the Godavari, the Krishna and the Kaveri are frequently struck by cyclones, which cause great damage to life and property.

DISTRIBUTION OF RAINFALL

1. The western coast and north-eastern India receive over about 400 cm of rainfall annually.
2. It is less than 60 cm in western Rajasthan and adjoining parts of Gujarat, Haryana and Punjab.
3. Rainfall is equally low in the interior of the Deccan plateau, and east of the Sahyadris
4. A third area of low precipitation is around Leh in Jammu and Kashmir
5. The rest of the country receives moderate rainfall.

6. Snowfall is restricted to the Himalayan region.

DRAINAGE

1. The term drainage describes the river system of an area.
2. The area drained by a single river system is called a **drainage basin**.

Water divide

Any elevated area, such as a mountain or upland, separates two drainage basins. Such an upland is known as a water divide

The world's largest drainage basin is of the Nile River in Egypt

DRAINAGE SYSTEMS IN INDIA

1. The drainage systems of India are mainly controlled by the broad relief features of the subcontinent.
2. The Indian rivers are divided into two major groups:

The Himalayan Rivers

1. Most of the Himalayan Rivers are perennial.
2. The two major Himalayan Rivers, **the Indus and the Brahmaputra** originate from the north of the mountain ranges.
3. They have cut through the mountains making **gorges**.
4. The Himalayan Rivers have long courses from their source to the sea.
5. They perform intensive erosional activity in their upper courses and carry huge loads of silt and sand.
6. In the middle and the lower courses, these rivers form meanders, oxbow lakes, and many other depositional features

The Peninsular Rivers

1. A large number of the Peninsular Rivers are seasonal

The Himalayan Rivers

The major Himalayan Rivers are the ***Indus, the Ganga and the Brahmaputra***.

River system -

A river along with its tributaries may be called a river system.

The Indus River System

1. The river Indus rises in Tibet, near Lake Mansarowar.
2. Flowing west, it enters India in the Ladakh district of Jammu and Kashmir.
3. It forms a picturesque gorge in this part.
4. Several tributaries, the Zaskar, the Nubra, the Shyok and the Hunza, join it in the Kashmir region.
5. The Indus flows through Baltistan and Gilgit and emerges from the mountains at Attock.
6. The Satluj, the Beas, the Ravi, the Chenab and the Jhelum join together to enter the Indus near Mithankot in Pakistan.
7. Beyond this, the Indus flows southwards eventually reaching the Arabian Sea, east of Karachi.
8. The Indus plain has a very gentle slope.
9. With a total length of 2900 km
10. A little over a third of the Indus basin is located in India in the states of Jammu and Kashmir, Himachal Pradesh and the Punjab and the rest is in Pakistan.

• According to the regulations of the Indus Water Treaty (1960), India can use only 20 per cent of the total water carried by Indus river system. This water is used for irrigation in the Punjab, Haryana and the southern and western parts of Rajasthan

The Ganga River System

1. The headwaters of the Ganga, called the 'Bhagirathi' is fed by the Gangotri Glacier and joined by the Alaknanda at Devprayag in Uttarakhand.
2. At Haridwar the Ganga emerges from the mountains on to the plains.
3. The Ganga is joined by many tributaries from the Himalayas, a few of them being major rivers such as the Yamuna, the Ghaghara, the Gandak and the Kosi.

4. The river Yamuna rises from the Yamunotri Glacier in the Himalayas.
5. It flows parallel to the Ganga and as a right bank tributary, meets the Ganga at Allahabad
6. The Ghaghara, the Gandak and the Kosi rise in the Nepal Himalaya.
7. They are the rivers, which flood parts of the northern plains every year, causing widespread damage to life and property but enriching the soil for the extensive agricultural lands.
8. The main tributaries, which come from the peninsular uplands, are the Chambal, the Betwa and the Son.
9. These rise from semi-arid areas, have shorter courses and do not carry much water in them.
10. The Ganga flows eastwards till Farakka in West Bengal.
11. This is the northernmost point of the Ganga delta
12. The river bifurcates here; the Bhagirathi-Hooghly (a distributary) flows southwards through the deltaic plains to the Bay of Bengal.
13. The mainstream, flows southwards into Bangladesh and is joined by the Brahmaputra.
14. Further downstream, it is known as the Meghna.
15. The length of the Ganga is over 2500 km.
16. Ambala is located on the water divide between the Indus and the Ganga river systems.
17. The plains from Ambala to the Sunderban stretch over nearly 1800 km, but the fall in its slope is hardly 300 metres.
18. In other words, there is a fall of just one metre for every 6 km. Therefore, the river develops large meanders.

Meghna

This mighty river, with waters from the Ganga, and the Brahmaputra, flows into the Bay of Bengal. The delta formed by these rivers is known as the Sunderban delta. The Sundarban Delta derived its name from the Sundari tree which grows well in marshland, it is the world's largest and fastest growing delta. It is also the home of Royal Bengal tiger.

The Brahmaputra River System

1. The Brahmaputra rises in Tibet east of Mansarowar Lake very close to the sources of the Indus and the Satluj.
2. It is slightly longer than the Indus, and most of its course lies outside India.
3. It flows eastwards parallel to the Himalayas. On reaching the Namcha Barwa (7757 m), it takes a 'U' turn
4. **Enters India in Arunachal Pradesh through a gorge.**
5. Here, it is called the Dihang and it is joined by the Dibang, the Lohit, the Kenula and
6. Many other tributaries to form the Brahmaputra in Assam
7. Brahmaputra is known as the Tsang Po in Tibet and Jamuna in Bangladesh.
8. In Tibet the river carries a smaller volume of water and less silt as it is a cold and a dry area
9. In India it passes through a region of high rainfall.
10. Here the river carries a large volume of water and considerable amount of silt.
11. The Brahmaputra has a braided channel in its entire length in Assam and forms many riverine islands
12. Unlike other north Indian rivers the Brahmaputra is marked by huge deposits of silt on its bed causing the river bed to rise. The river also shifts its channel frequently

The Peninsular Rivers

1. The main water divide in Peninsular India is formed by the Western Ghats, which runs from north to south close to the western coast.
2. Most of the major rivers of the Peninsula such as the Mahanadi, the Godavari, the Krishna and the Kaveri flow eastwards and drain into the Bay of Bengal.
3. There are numerous small streams flowing west of the Western Ghats
4. **The Narmada and the Tapi are the only long rivers, which flow west and make estuaries.**

The Narmada Basin

1. The Narmada rises in the Amarkantak hills in Madhya Pradesh.
2. It flows towards the west in a rift valley formed due to faulting.
3. The 'Marble rocks', near Jabalpur where the Narmada flows through a deep gorge, and the 'Dhuadhar falls' where the river plunges over steep rocks, are some of the notable ones.
4. The Narmada basin covers parts of Madhya Pradesh and Gujarat.

The Tapi

1. The Tapi rises in the Satpura ranges, in the Betul district of Madhya Pradesh.
2. It also flows in a rift valley parallel to the Narmada but it is much shorter in length.
3. Its basin covers parts of Madhya Pradesh, Gujarat and Maharashtra.
4. The coastal plains between Western Ghats and the Arabian Sea are very narrow.
5. Hence, the coastal rivers are short. The main west flowing rivers are Sabarmati, Mahi, Bharathpuzha and Periyar. Find out the states in which these rivers drain the water.

The Godavari Basin

1. The Godavari is the largest Peninsular River.
2. It rises from the slopes of the Western Ghats in the Nasik district of Maharashtra.
3. Its length is about 1500 km.
4. It drains into the Bay of Bengal. Its drainage basin is also the largest among the peninsular rivers.
5. The basin covers parts of Maharashtra (about 50 per cent of the basin area lies in Maharashtra), Madhya Pradesh, Orissa and Andhra Pradesh.
6. The Godavari is joined by a number of tributaries such as the Purna, the Wardha, the Pranhita, the Manjra, the Wainganga and the Penganga.

'Dakshin Ganga'
Because of its length and the area it covers, it is also known as the 'Dakshin Ganga'

The Mahanadi Basin

1. The Mahanadi rises in the highlands of Chhattisgarh.
2. It flows through Orissa to reach the Bay of Bengal.
3. The length of the river is about 860 km. Its drainage basin is shared by Maharashtra, Chhattisgarh, Jharkhand, and Orissa.

The Krishna Basin

1. Rising from a spring near Mahabaleshwar, the Krishna flows for about 1400 km and reaches the Bay of Bengal.
2. The Tungabhadra, the Koyana, the Ghatprabha, the Musi and the Bhima are some of its tributaries.
3. Basin is shared by Maharashtra, Karnataka and Andhra Pradesh.

The Kaveri Basin

1. The Kaveri rises in the Brahmagiri range of the Western Ghats and it reaches the Bay of Bengal in south of Cuddalore, in Tamil Nadu.
2. Total length of the river is about 760 km.
3. Its main tributaries are Amravati, Bhavani, Hemavati and Kabini.
4. Its basin drains parts of Karnataka, Kerala and Tamil Nadu
5. The river Kaveri makes the second biggest waterfall in India. It is known as Sivasamudram. The fall supplies hydroelectric power to Mysore, Bangalore and the Kolar Gold Field.
6. 71 per cent of the world's surface is covered with water, but 97 per cent of that is salt water. • Of the 3 per cent that is available as freshwater, three quarters of it is trapped as ice.

LAKES

1. Lakes of large extent are called the seas, like the Caspian, the Dead and the Aral seas.
2. A meandering river across a flood plain forms cut-offsthat later develop into ox-bow lakes.
3. Spits and bars form lagoons in the coastal areas, eg the Chilika Lake, the Pulicat Lake, and the Kolleru Lake.
4. Most of the fresh water lakes are in the Himalayan region. They are of glacial origin.
5. In other words, they formed when glaciers dug out a basin, which was later filled with snowmelt.
6. The Wular Lake in Jammu and Kashmir, in contrast, is the result of the tectonic activity. **It is the largest freshwater lake in India.**
7. The Dal Lake, Bhimtal, Nainital, Loktak and Barapani are some other important fresh water lakes
8. The damming of the rivers for the generation of hydel power has also led to the formation of Lakes such as Guru Gobind Sagar (Bhakra Nangal Project).
9. Lakes are of great value to human beings. A lake helps to regulate the flow of a river.
10. During heavy rainfall, it prevents flooding and during the dry season, it helps to maintain an even flow of water.
11. Lakes can also be used for developing hydel power
12. They moderate the climate of the surroundings;
13. Maintain the aquatic ecosystem
14. Enhance natural beauty, help develop tourism and provide recreation

ROLE OF RIVERS IN THE ECONOMY

1. Rivers have been of fundamental importance throughout the human history.
2. The river banks have attracted settlers from ancient times
3. Using rivers for irrigation, navigation, hydro-power generation is of special significance

RIVER POLLUTION

1. The growing domestic, municipal, industrial and agricultural demand for water from rivers naturally affects the quality of water.
2. As a result, more and more water is being drained out of the rivers reducing their volume.
3. A heavy load of untreated Sewage and industrial effluents are emptied into the rivers.
4. This affects not only the quality of water but also the self-cleansing capacity of the river.
5. Given the adequate stream flow, the Ganga water is able to dilute and assimilate pollution loads within 20 km of large cities.
6. But the increasing urbanisation and industrialisation do not allow it to happen and the pollution level of many rivers has been rising.

WATER RESOURCES

71 per cent of the earth's surface is covered with it but fresh water constitutes only about 3 per cent of the total water.

Water Resources of India

1. India accounts for about 2.45 per cent of world's surface area
2. 4 per cent of the world's water resources and about 16 per cent of world's population.
3. The total water available from precipitation in the country in a year is about 4,000 cubic km.
4. The availability from surface water and replenish able groundwater is 1,869 cubic km.
5. Out of this only 60 per cent can be put to beneficial uses
6. Thus, the total utilisable water resource in the country is only 1,122 cubic km.

Surface Water Resources

1. There are four major sources of surface water
2. These are rivers, lakes, ponds, and tanks
3. There are about 10,360 rivers and their tributaries longer than 1.6 km each.
4. The mean annual flow in all the river basins in India is estimated to be 1,869 cubic km.
5. Only about 690 cubic km (32 per cent) of the available surface water can be utilised.
6. Ganga, the Brahmaputra and the Barak rivers,
7. Although account for only about one-third of the total area in the country
8. Have 60 per cent of the total surface water resources.

Groundwater Resources

1. *The total replenishable groundwater resources in the country are about 432 cubic km.*
2. *The Ganga and the Brahmaputra basins, have about 46 per cent of the total replenishable groundwater resources.*
3. *The level of groundwater utilisation is relatively high in the river basins lying in north-western region and parts of south India.*
4. *The groundwater utilisation is **very high in the states of Punjab, Haryana, Rajasthan, and Tamil Nadu.***
5. *However, there are States like Chhattisgarh, Orissa, Kerala, etc., which utilise only a small proportion of their groundwater potentials.*
6. *States like Gujarat, Uttar Pradesh, Bihar, Tripura and Maharashtra are utilising their ground water resources at a moderate rate.*

Lagoons and Backwaters

1. India has a vast coastline and the coast is very indented in some states
2. The States like Kerala, Orissa and West Bengal have vast surface water resources in these lagoons and lakes.
3. Although, water is generally brackish in these water-bodies, it is used for fishing and irrigating certain varieties of paddy crops, coconut, etc.

Water Demand and Utilisation

1. India has traditionally been an agrarian economy, and about two-third of its population have been dependent on agriculture.
2. Hence, development of irrigation to increase agricultural production has been assigned a very high priority in the Five Year Plans
3. And multipurpose river valleys projects like the Bhakra-Nangal, Hirakud, Damodar Valley, Nagarjuna Sagar, Indira Gandhi Canal Project, etc. have been taken up.
4. *Agriculture accounts for most of the surface and ground water utilisation, it accounts for 89 per cent of the surface water and 92 per cent of the groundwater utilisation.*
5. *While the share of industrial sector is limited to 2 per cent of the surface water utilisation and 5 per cent of the ground-water.*
6. The share of domestic sector is higher (9 per cent) in surface water utilisation as compared to groundwater.

Demand of Water for Irrigation

1. The large tracts of the country are deficient in rainfall and are drought prone.
2. North-western India and Deccan plateau constitute such areas.
3. Winter and summer seasons are more or less dry in most part of the country.
4. Water need of certain crops also makes irrigation necessary. For instance, water requirement of rice, sugarcane, jute, etc. is very high which can be met only through irrigation.
5. Provision of irrigation makes multiple cropping possible.
6. It has also been found that irrigated lands have higher agricultural productivity than unirrigated land.
7. The high yielding varieties of crops need regular moisture supply,
8. This is why that green revolution strategy of agriculture development in the country has largely been successful in Punjab, Haryana and western Uttar Pradesh.
9. In Punjab, Haryana and Western Uttar Pradesh more than 85 per cent of their net sown area is under irrigation.
10. Wheat and rice are grown mainly with the help of irrigation in these states.

11. *Of the total net irrigated area 76.1 per cent in Punjab and 51.3 per cent in Haryana are irrigated through wells and tube wells.*
12. In fact, over withdrawals in some states like Rajasthan, and Maharashtra has increased fluoride concentration in ground-water
13. This practice has led to increase in concentration of arsenic in parts of West Bengal and Bihar.

Emerging Water Problems

1. The per capita availability of water is dwindling day by day due to increase in population.
2. The available water resources are also getting polluted with industrial, agricultural and domestic effluents,
3. Water quality refers to purity of water, or water without unwanted foreign substances.
4. Water gets polluted by foreign matters such as microorganisms, chemicals, industrial and other wastes
5. The Ganga and the Yamuna are the two highly polluted rivers in the country.

Water Conservation and Management

1. Besides developing water saving technologies and methods, attempts are also to be made to prevent the pollution.
2. There is need to encourage watershed development, rainwater harvesting, water recycling and reuse, and conjunctive use of water for sustaining water supply in long run.
3. Prevention of Water Pollution
4. Available water resources are degrading rapidly.
5. The Central Pollution Control Board (CPCB) in collaboration with State Pollution Control Boards has been monitoring water quality of national aquatic resources at 507 stations.
6. Data obtained from these stations show that organic and bacterial contamination continues to be the main source of pollution in rivers.
7. The Yamuna River is the most polluted river in the country between Delhi and Etawah.
8. Other severely polluted rivers are: the Sabarmati at Ahmedabad, the Gomti at Lucknow, the Kali, the Adyar, the Cooum (entire stretches), the Vaigai at Madurai and the Musi of Hyderabad and the Ganga at Kanpur and Varanasi.
9. Groundwater pollution has occurred due to high concentrations of heavy/toxic metals, fluoride and nitrates at different parts of the country.
10. The legislative provisions such as the Water (Prevention and Control of Pollution) Act 1974,
11. Environment Protection Act 1986
12. Have not been implemented effectively.
13. The Water Cess Act, 1977, meant to reduce pollution has also made marginal impacts.

Recycle and Reuse of Water

1. Another way through which we can improve fresh water availability is by recycle and reuse.
2. Use of water of lesser quality such as reclaimed waste-water would be an attractive option for industries for cooling and firefighting to reduce their water cost.
3. Similarly, in urban areas water after bathing and washing utensils can be used for gardening.
4. Watershed Management
5. Watershed management basically refers to efficient management and conservation of surface and groundwater resources.

6. It involves prevention of runoff and storage and recharge of groundwater through various methods like percolation tanks, recharge wells, etc.
7. However, in broad sense watershed management includes conservation, regeneration and judicious use of all resources – natural (like land, water, plants and animals) and human within a watershed.
8. Watershed management aims at bringing about balance between natural resources on the one hand and society on the other.
9. Haryali is a watershed development project sponsored by the Central Government which aims at enabling the rural population to conserve water for drinking, irrigation, fisheries and afforestation.
10. The Project is being executed by Gram Panchayats with people's participation.
11. *Neeru-Meeru (Water and You) programme (in Andhra Pradesh)*
12. *Arvary Pani Sansad (in Alwar, Rajasthan)* have taken up constructions of various water-harvesting structures such as percolation tanks, dug out ponds (Johad), check dams, etc. through people's participation.
13. *Tamil Nadu has made water harvesting structures in the houses compulsory.* No building can be constructed without making structures for water harvesting.
14. Watershed development projects in some areas have been successful in rejuvenating environment and economy.

Rainwater Harvesting

1. Rain water harvesting is a method to capture and store rainwater for various uses
2. It is also used to recharge groundwater aquifers.
3. It is a low cost and eco-friendly technique for preserving every drop of water by guiding the rain water to bore well, pits and wells
4. In Rajasthan, rainwater harvesting structures locally known as Kund or Tanka Irrigation

Population

1. Population is the pivotal element in social studies. It is the point of reference from which all other elements are observed and from which they derive significance and meaning

Census

1. A census is an official enumeration of population done periodically. In India the first census was held in the year 1872.
2. The first complete census, however was taken in the year 1881. Since then censuses have been held regularly every tenth year

Three major questions about the population

1. Population size and distribution
2. Population growth and processes of population change
3. Characteristics or qualities of the population

POPULATION SIZE AND DISTRIBUTION

1. India's Population Size and Distribution by Numbers
2. India's population as on March 2001 stood at 1,028 million, which account for 16.7 per cent of the world's population.
3. These 1.02 billion people are unevenly distributed over our country's vast area of 3.28 million square km
4. Which accounts for 2.4 per cent of the world's area
5. The 2001 Census data reveals that Uttar Pradesh with a population size of 166 million people is the most populous state of India

6. Uttar Pradesh accounts for about 16 per cent
7. On the other hand, the Himalayan state Sikkim has a population of just about 0.5 million
8. Lakshadweep has only 60 thousand people.
9. Almost half of India's population lives in just five states.
10. These are Uttar Pradesh, Maharashtra, Bihar, West Bengal, and Andhra Pradesh. Rajasthan,
11. The biggest state in terms of area, has only 5.5 per cent of the total population of India

India's Population Distribution by Density

1. Population density provides a better picture of the uneven distribution
2. Calculated as the number of persons per unit area.
3. India is one of the most densely populated countries of the world
4. Only Bangladesh and Japan have higher average population densities than India. Find out the population densities of Bangladesh and Japan.
5. The population density of India in the year 2001 was 324 persons per sq. km
6. Only 13 persons per sq. km in Arunachal Pradesh
7. The Northern Plains and Kerala in the south have high to very high population densities because of the flat plains with fertile soils and abundant rainfall.

POPULATION GROWTH AND PROCESSES OF POPULATION CHANGE

1. Population is a dynamic phenomenon.
2. The numbers, distribution and composition of the population are constantly changing.
3. This is the influence of the interaction of the three processes, namely-births, deaths and migrations

Population Growth

1. Growth of population refers to the change in the number of inhabitants of a country/territory during a specific period of time
2. Such a change can be expressed in two way
 - *In terms of absolute numbers*
 - *In terms of percentage change per year*
3. The absolute numbers added each year or decade is the magnitude of increase
4. It is obtained by simply subtracting the earlier population (e.g. that of 1991) from the later population (e.g. that of 2001). It is referred to as the absolute increase
5. The rate or the pace of population increase is the other important aspect.
6. It is studied in per cent per annum, e.g. a rate of increase of 2 per cent per annum means that in a given year
7. There was an increase of two persons for every 100 persons in the base population.
8. This is referred to as the annual growth rate
9. Since 1981, however, the rate of growth started declining gradually
10. During this period, birth rates declined rapidly.
11. It is essential to realise that India has a very large population.
12. When a low annual rate is applied to a very large population
13. It yields a large absolute increase
14. When more than a billion people increase even at a lower rate, the total numbers being added becomes very large

Processes of Population Change/Growth

1. There are three main processes of change of population
2. Birth rates, death rates and migration.
3. Birth rate is the number of live births per thousand persons in a year

4. It is a major component of growth because in India, birth rates have always been higher than death rates
5. The main cause of the rate of growth of the Indian population has been the rapid decline in death rates
6. Till 1980, high birth rates and declining death rates led to a large difference between birth rates and death rates resulting in higher rates of population growth
7. Since 1981, birth rates have also started declining gradually,
8. Resulting in a gradual decline in the rate of population growth.
9. The third component of population growth is migration
10. Migration can be internal (within the country) or international (between the countries)
11. Internal migration does not change the size of the population, but influences the distribution of population within the nation
12. In India, the rural-urban migration has resulted in a steady increase in the percentage of population in cities and towns
13. The urban population has increased from 17.29 per cent of the total population in 1951 to 27.78 per cent in 2001.

Age Composition

1. The age composition of a population refers to the number of people in different age groups in a country.
2. It is one of the most basic characteristics of a population
3. To an important degree, a person's age influences what he needs, buys, does and his capacity to perform?
4. The number and percentage of a population found within the children, working age and aged groups are notable determinants of the population's social and economic structure.

Children (generally below 15 years)

- They are economically unproductive and need to be provided with food, clothing, education and medical care

Working Age (15-59 years)

- They are economically productive and biologically reproductive. They comprise the working population

Aged (Above 59 years)

- They can be economically productive though they and may have retired.
- They may be working voluntarily but they are not available for employment through recruitment
- The percentage of children and the aged affect the dependency ratio because these groups are not producers.

Sex Ratio

- Sex ratios defined as the number of females per 1000 males in the population
- This information is an important social indicator to measure the extent of equality between males and females in a society at a given time
- The sex ratio in the country has always remained unfavourable to females.
- Kerala has a sex ratio of 1058 females per 1000 males, Pondicherry has 1001 females for every 1000 males, while Delhi has only 821 females per 1000 and Haryana has just 861

Literacy Rates

1. Literacy is a very important quality of a population. Obviously, only an informed and educated citizen can make intelligent choices
2. Undertake research and development projects
3. Low levels of literacy are a serious obstacle for economic improvement.
4. According to the Census of 2001, a person aged 7 years and above who can read and write with understanding in any language, is treated as literate.

Occupational Structure

1. The percentage of population that is economically active is an important index of development.
2. The distribution of the population according to different types of occupation is referred to as the occupational structure.
3. Developed nations have a high proportion of people in secondary, and tertiary activities
4. Developing countries tend to have a higher proportion of their workforce engaged in primary activities
5. In India, about 64 per cent of the population is engaged only in agriculture
6. Health
7. Health is an important component of population composition, which affects the process of development
8. Sustained efforts of government programmes have registered significant improvements in the health conditions of the Indian population.
9. Death rates have declined from 25 per 1000 population in 1951 to 8.1 per 1000 in 2001
10. Death rates have declined from 25 per 1000 population in 1951 to 8.1 per 1000 in 2001
11. . The per capita calorie consumption is much below the recommended levels and malnutrition afflicts a large percentage of our population

Adolescent Population

1. The most significant feature of the Indian population is the size of its adolescent population.
2. It constitutes one-fifth of the total population of India.
3. Adolescents are generally grouped in the age-group of 10 to 19 years
4. They are the most important resource for the future.
5. Nutrition requirements of adolescents are higher than those of a normal child or adult.
6. Nutrition requirements of adolescents are higher than those of a normal child or adult.
7. But in India, the diet available to adolescents is inadequate in all nutrients.

National Population Policy

1. Recognising that the planning of families would improve individual health and welfare,
2. The Government of India initiated the comprehensive Family Planning Programme in 1952.
3. The Family Welfare Programme has sought to promote responsible and planned parenthood on a voluntary basis.
4. The NPP 2000 provides a policy framework for imparting free and compulsory school education up to 14 years of age
5. Reducing infant mortality rate to below 30 per 1000 live births,
6. Achieving universal immunisation of children against all vaccine preventable diseases,
7. Promoting delayed marriage for girls, and making family welfare a people-centered programme

NPP 2000 and Adolescents

1. NPP 2000 identified adolescents as one of the major sections of the population that need greater attention.
2. Besides nutritional requirements, the policy put greater emphasis on other important needs of adolescents including protection from unwanted pregnancies and sexually transmitted diseases (STD).

3. It called for programmes that aim towards encouraging delayed marriage and child-bearing, education of adolescents about the risks of unprotected sex
4. Making contraceptive services accessible and affordable, providing food supplements
5. Providing food supplements, nutritional services, strengthening legal measures to prevent child marriage
6. People are the nation's most valuable resource. A well- educated healthy population provides potential power.

POPULATION D distribution, Density, Growth and Composition

1. India's population is larger than the total population of North America, South America and Australia put together.
2. More often, it is argued that such a large population invariably puts pressure on its limited resources and is also responsible for many socio-economic problems in the country.

Distribution of Population

1. Uttar Pradesh has the highest population followed by Maharashtra, Bihar, West Bengal and Andhra Pradesh
2. U.P., Maharashtra, Bihar, West Bengal, Andhra Pradesh along with Tamil Nadu, Madhya Pradesh, Rajasthan, Karnataka and Gujarat, together account for about 76 per cent of the total population of the country.
3. On the other hand, share of population is very small in the states like Jammu & Kashmir (0.98%), Arunachal Pradesh (0.11%) and Uttarakhand (0.83%) in spite of these states having fairly large geographical area
4. Such an uneven spatial distribution of population in India suggests a close relationship between population and physical, socioeconomic and historical factors.
5. Consequently, we observe that the North Indian Plains, deltas and Coastal Plains have higher proportion of population than the interior districts of southern and central Indian States
6. Himalayas, some of the north eastern and the western states. However, development of irrigation (Rajasthan), availability of mineral and energy resources (Jharkhand) and development of transport network (Peninsular States) have resulted in moderate to high proportion of population in areas which were previously very thinly populated
7. Among the socio-economic and historical factors of distribution of population, important ones are evolution of settled agriculture and agricultural development
8. Pattern of human settlement; development of transport network, industrialisation and urbanisation.
9. The concentration of population remains high because of an early history of human settlement and development
10. On the other hand, the urban regions of Delhi, Mumbai, Kolkata, Bangalore, Pune, Ahmedabad, Chennai and Jaipur have high concentration of population
11. On the other hand, the urban regions of Delhi, Mumbai, Kolkata, Bangalore, Pune, Ahmedabad, Chennai and Jaipur have high concentration of population

Density of Population

1. The density of population in India (2001) is 313 persons per sq. km and ranks third among the most densely populated countries of Asia following Bangladesh (849 persons) and Japan (334 persons).
2. There has been a steady increase of about 200 persons per sq. km over the last 50 years as the density of population increased

3. From 117 persons/ sq. km in 1951 to 313 persons/sq. km in 2001
4. Which ranges from as low as 13 persons per sq. km in Arunachal Pradesh to 9,340 persons in the National Capital Territory of Delhi.
5. Among the northern Indian States, West Bengal (903), Bihar (880) and Uttar Pradesh (690) have higher densities
6. While Kerala (819) and Tamil Nadu (480) have higher densities among the peninsular Indian states
7. States like Assam, Gujarat, Andhra Pradesh, Haryana, Jharkhand, and Orissa have moderate densities

Growth of Population

1. Growth of population is the change in the number of people living in a particular area between two points of time
2. Its rate is expressed in percentage.

Population growth has two components

1. Namely; natural and induced
2. While the natural growth is analysed by assessing the crude birth and death rates
3. Induced components are explained by the volume of inward and outward movement of people in any given area the growth rate of population in India over the last one century has been caused by annual birth rate and death rate and rate of migration and thereby shows different trends.
4. There are four distinct phases of growth identified within this period:
5. Phase I: The period from 1901-1921 is referred to as a period of stagnant or stationary phase of growth of India's population
6. Even recording a negative growth rate during 1911-1921
7. Phase II: The decades 1921-1951 are referred to as the period of steady population growth.
8. An overall improvement in health and sanitation throughout the country brought down the mortality rate.
9. Phase III: The decades 1951-1981 are referred to as the period of population explosion in India
10. Which was caused by a rapid fall in the mortality rate but a high fertility rate of population in the country.
11. Phase IV: In the post 1981 till present, the growth rate of country's population though remained high
12. A downward trend of crude birth rate is held responsible for such a population growth
13. It has been projected by World Development Report that population of India will touch 1,350 million by 2025.

Regional Variation in Population Growth

1. The States like Kerala, Karnataka, Tamil Nadu, Andhra Pradesh, Orissa, Pondicherry, and Goa show a low rate of growth not exceeding 20 per cent over the decade.
2. Kerala registered the lowest growth rate (9.4) not only in this group of states but also in the country as a whole
3. A continuous belt of states from west to east in the north-west, north, and north central parts of the country has relatively high growth rate than the southern states.
4. It is in this belt comprising Gujarat, Maharashtra, Rajasthan, Punjab, Haryana, Uttar Pradesh, Uttaranchal, Madhya Pradesh, Sikkim, Assam, West Bengal, Bihar, Chhattisgarh, and Jharkhand, the growth rate on the average remained 20-25 per cent
5. An important aspect of population growth in India is the growth of its adolescents.
6. At present the share of adolescents i.e. up to the age group of 10-19 years is about 22 per cent
7. Among which male adolescents constitute 53 per cent and female adolescents constitute 47 per cent
8. The adolescent population, though, regarded as the youthful population having high potentials, but at the same time they are quite vulnerable if not guided and channelized properly.

Population Composition

- Analysis of age and sex, place of residence, ethnic characteristics, tribes, language, religion, marital status, literacy and education, occupational characteristics, etc.

Rural – Urban Composition

1. Composition of population by their respective places of residence is an important indicator of social and economic characteristics
2. 72 per cent of its total population lives in villages
3. The distribution of rural population is not uniform throughout the country
4. States like Bihar and Sikkim have very high percentage of rural population
5. The states of Goa and Maharashtra have only little over half of their total population residing in villages
6. The size of villages also varies considerably
7. It is less than 200 persons in the hill states of north-eastern India
8. Western Rajasthan and Rann of Kutch
9. As high as 17 thousand persons in the states of Kerala and in parts of Maharashtra.
10. The proportion of urban population (27.8 per cent) in India is quite low but it is showing a much faster rate of growth over the decades
11. In fact since 1931, the growth rate of urban population has accelerated due to enhanced economic development and improvement in health and hygienic conditions.

Linguistic Composition

1. India is a land of linguistic diversity
2. According to Grierson (Linguistic Survey of India, 1903 – 1928) there were 179 languages and as many as 544 dialects in the country
3. In the context of modern India, there are about 18 scheduled languages (1991 census) and a number of non-scheduled languages
4. Among the scheduled languages, the speakers of Hindi have the highest percentage (40.42)
5. The smallest language groups are Kashmiri and Sanskrit speakers (0.01 per cent each).

Linguistic Classification

1. The speakers of major Indian languages belong to four language families
2. Which have their sub-families and branches or groups
 - Austric (Nishada) 1.38%
 - Dravidian (Dravida) 20%
 - Sino-Tibetan (Kirata) 0.85%
 - Indo – European (Aryan) 73%

Religious Composition

1. Religion is one of the most dominant forces affecting the cultural and political life of the most of Indians.
2. Muslims, the largest religious minority, are concentrated in Jammu & Kashmir, certain districts of West Bengal and Kerala
3. Many districts of Uttar Pradesh, in and around Delhi and in Lakshadweep.
4. They form majority in Kashmir valley and Lakshadweep
5. The Christian population is distributed mostly in rural areas of the country
6. The main concentration is observed along the Western coast around Goa, Kerala and also in the hill states of Meghalaya, Mizoram, Nagaland, Chotanagpur area and Hills of Manipur
7. Sikhs are mostly concentrated in relatively small area of the country, particularly in the states of Punjab, Haryana and Delhi.

8. Jains and Buddhists, the smallest religious groups in India have their concentration only in selected areas of the country.
9. Major concentration in the urban areas of Rajasthan, Gujarat and Maharashtra
10. While the Buddhists are concentrated mostly in Maharashtra.
11. The other areas of Buddhist majority are Sikkim, Arunachal Pradesh, and Ladakh in Jammu & Kashmir, Tripura, and Lahul and Spiti in Himachal Pradesh.
12. The other religions of India include Zoroastrians, tribal and other indigenous faiths and beliefs.

Composition of Working Population

1. The population of India according to their economic status is divided into three groups
 - Main workers
 - Marginal workers
 - Non-workers.

Standard Census Definition

- Main Worker is a person who works for atleast 183 days in a year
 - Marginal Worker is a person who works for less than 183 days in a year
 - It is observed that in India, the proportion of workers (both main and marginal) is only 39 per cent (2001)
2. Leaving a vast majority of 61 per cent as non-workers.
 3. This indicates an economic status in which there is a larger proportion of dependent population,
 4. Further indicating possible existence of large number of unemployed or under employed people.
 5. The proportion of working population, of the states and Union Territories show a moderate variation from about 25 per cent in Goa to about 53 per cent in Mizoram
 6. The states with larger percentages of workers are Himachal Pradesh, Sikkim, Chhattisgarh, Andhra Pradesh, Karnataka, Arunachal Pradesh, Nagaland, Manipur and Meghalaya
 7. Among the Union Territories, Dadra and Nagar Haveli and Daman and Diu have higher participation rate.
 8. In the context of a country like India, the work participation rate tends to be higher
 9. In the areas of lower levels of economic development since number of manual workers are needed to perform the subsistence or near subsistence economic activities

MIGRATION Types, Causes and Consequences

1. Migration was recorded beginning from the first Census of India conducted in 1881.
2. This data were recorded on the basis of place of birth
3. However, the first major modification was introduced in 1961 Census by bringing in two additional components viz; place of birth i.e. village or town and duration of residence (if born elsewhere)
4. Further in 1971, additional information on place of last residence and duration of stay at the place of enumeration were incorporated.
5. Information on reasons for migration were incorporated in 1981 Census and modified in consecutive Censuses

In the Census of India migration is enumerated on two bases

- Place of birth, if the place of birth is different from the place of enumeration (known as life-time migrant);
- Place of residence, if the place of last residence is different from the place of enumeration (known as migrant by place of last residence).

Streams of Migration

Under the internal Migration four streams are identified:

- Rural to rural (R-R)
 - Rural to urban (R-U)
 - Urban to urban (U-U)
 - Urban to rural (U-R).
1. Some states like Maharashtra, Delhi, Gujarat and Haryana attract migrants from other states such as Uttar Pradesh, Bihar, etc.
 2. Maharashtra occupied first place in the list with 2.3 million net in-migrants, followed by Delhi, Gujarat and Haryana
 3. On the other hand, Uttar Pradesh (-2.6 million) and Bihar (-1.7 million) were the states, which had the largest number of net out-migrants from the state
 4. Among the urban agglomeration (UA), Greater Mumbai received the higher number of in migrants.
 5. Intra-states migration constituted the largest share in it

Consequences of Migration

- People tend to move from place of low opportunity and low safety to the place of higher opportunity and better safety.

Economic Consequences

1. Remittances from the international migrants are one of the major sources of foreign exchange.
2. Punjab, Kerala and Tamil Nadu receive very significant amount

Demographic Consequences

1. Migration leads to the redistribution of the population within a country.
2. Rural urban migration is one of the important factors contributing to the population growth of cities.
3. Age and skill selective out migration from the rural area have adverse effect on the rural demographic structure.
4. However, high out migration from Uttaranchal, Rajasthan, Madhya Pradesh and Eastern Maharashtra have brought serious imbalances in age and sex composition in these states.

Social Consequences

1. Migration leads to intermixing of people from diverse cultures. It has positive contribution such as evolution of composite culture
2. Migration leads to intermixing of people from diverse cultures. It has positive contribution such as evolution of composite culture
3. Negative consequences such as anonymity, which creates social vacuum and sense of dejection among individuals

Others

1. Migration (even excluding the marriage migration) affects the status of women directly or indirectly.
2. In the rural areas, male selective out migration leaving their wives behind puts extra physical as well mental pressure on the women

3. Migration of 'women' either for education or employment enhances their autonomy and role in the economy but also increases their vulnerability.
4. If remittances are the major benefits of migration from the point of view of the source region,
5. The loss of human resources particularly highly skilled people is the most serious cost.

HUMAN DEVELOPMENT

First Human Development Report by United Nations Development Programme (UNDP) in 1990.

What is Human Development?

1. "Human development is a process of enlarging the range of people's choices, increasing their opportunities for education, health care, income and empowerment and covering the full range of human choices from a sound physical environment to economic, social and political freedom."
2. According to the Human Development Report 1993, "progressive democratisation and increasing empowerment of people are seen as the minimum conditions for human development".
3. It also mentions that "development must be woven around people, not the people around development" as was the case previously

Human Development in India

1. India with a population of over 1.09 billion is ranked 127 among 172 countries of the world in terms of the Human Development Index (HDI).
2. With the composite HDI value of 0.602 India finds herself grouped with countries showing medium human development (UNDP 2005).
3. Using the indicators selected by the UNDP, the Planning Commission of India also prepared the Human Development Report for India.
4. The final HDI by the Planning Commission of India has been calculated by taking the three indicators
5. This report also discussed other indicators like
 - Economic attainment
 - Social empowerment
 - Social distributive justice
 - Accessibility
 - Hygiene
 - Indicators of Economic Attainments

Gross National Product (GNP) and its per capita availability are taken as measures to assess the resource base/ endowment of any country

For India, it is estimated that its GDP was Rs. 3200 thousand crores (at current Price) and accordingly, per capita income was Rs. 20,813 at current prices.

Indicators of a Healthy Life

1. Life free from illness and ailment and living a reasonably long life span are indicative of a healthy life.
2. India has done reasonably well in some of the health indicators like
3. Decline in death rate from 25.1 per thousand in 1951 to 8.1 per thousand in 1999
4. Infant mortality from 148 per thousand to 70 during the same period.
5. It also succeeded in increasing life expectancy at birth from 37.1 years to 62.3 years for males
6. 36.2 to 65.3 years for females from 1951 to 1999.
7. It has also done reasonably well in bringing down birth rate from 40.8 to 26.1 during the same years

Indicators of Social Empowerment

1. "Development is freedom". Freedom from hunger, poverty, servitude, bondage, ignorance, illiteracy and any other forms of domination is the key to human development
2. Literacy is the beginning of access to such a world of knowledge and freedom.

HUMAN SETTLEMENTS

1. Human Settlement means cluster of dwellings of any type or size where human beings live.
2. Settlements could be small and sparsely spaced; they may also be large and closely spaced.
3. It can be divided into **rural settlement and urban settlement.**

Types of Rural Settlement

1. There are various factors and conditions responsible for having different types of rural settlements in India. These include
 - Physical features – nature of terrain, altitude, climate and availability of water

- Cultural and ethnic factors – social structure, caste and religion
- Security factors – defence against thefts and robberies.

Rural settlements in India can broadly be put into four types

1. Clustered, agglomerated or nucleated
2. Semi-clustered or fragmented
3. Hamleted
4. Dispersed or isolated

Clustered Settlements

1. The clustered rural settlement is a compact or closely built up area of houses.
2. In this type of village the general living area is distinct and separated from the surrounding farms, barns and pastures.
3. Intervening streets present some recognisable pattern or geometric shape.
4. Rectangular, radial, linear, etc.
5. Such settlements are generally found in fertile alluvial plains and in the north eastern states
6. In Rajasthan, scarcity of water has necessitated compact settlement for maximum utilisation of available water resources

Semi-Clustered Settlements

1. Semi-clustered or fragmented settlements may result from tendency of clustering in a restricted area of dispersed settlement
2. Fragmentation of a large compact village.
3. In such cases, generally, the land-owning and dominant community occupies the central part of the main village
4. Whereas people of lower strata of society and menial workers settle on the outer flanks of the village
5. Such settlements are widespread in the Gujarat plain and some parts of Rajasthan

Hamleted Settlements

1. Sometimes settlement is fragmented into several units physically separated from each other bearing a common name
2. These units are locally called panna, para, palli, nagla, dhani, etc.
3. This segmentation of a large village is often motivated by social and ethnic factors.
4. Such villages are more frequently found in the middle and lower Ganga plain, Chhattisgarh and lower valleys of the Himalayas.
5. Reasons, such as in the Bundelkhand region of central India and in Nagaland. In Rajasthan, scarcity of water has necessitated compact settlement for maximum utilisation of available water resources.etc. In various parts of the country. This segmentation of a large village is often motivated by social and ethnic factors. Such villages are more frequently found in the middle and lower Ganga plain, Chhattisgarh and lower valleys of the Himalayas.

Dispersed Settlements

1. Dispersed or isolated settlement pattern in India appears in the form of isolated huts or hamlets of few huts in remote jungles
2. Pasture on the slopes
3. Extreme dispersion of settlement is often caused by extremely fragmented nature of the terrain
4. Land resource base of habitable areas

Urban Settlements

On the basis of evolution in different periods Indian towns may be classified as:

- Ancient towns
- Medieval towns
- Modern towns

Ancient Towns

1. Historical background spanning over 2000 years
2. Most of them developed as religious and cultural centres
3. Varanasi is one of the important towns among these
4. Prayag (Allahabad), Pataliputra (Patna), Madurai are some other examples of ancient towns in the country

Medieval Towns

1. About 100 of the existing towns have their roots in the medieval period
2. Most of them developed as headquarters of principalities and kingdoms
3. These are fort towns which came up on the ruins of ancient towns
4. Important among them are Delhi, Hyderabad, Jaipur, Lucknow, Agra and Nagpur

Modern Towns

1. The British and other Europeans have developed a number of towns in India
2. The British and other Europeans have developed a number of towns in India
3. Surat, Daman, Goa, Pondicherry, etc.
4. The British later consolidated their hold around three principal nodes
5. Mumbai (Bombay), Chennai (Madras), and Kolkata (Calcutta)

Urbanisation in India

- The level of urbanisation is measured in terms of percentage of urban population to total population.

Definitions of town

For the Census of India 2011, the definition of urban area is as follows;

1. All places with a municipality, corporation, cantonment board or Notified town area committee, etc.
2. All other places which satisfied the following criteria:
 - i) A minimum population of 5,000
 - ii) At least 75 per cent of the male main working population engaged in non-agricultural pursuits
 - iii) A density of population of at least 400 persons per sq. km.

The first category of urban units is known as Statutory Towns.

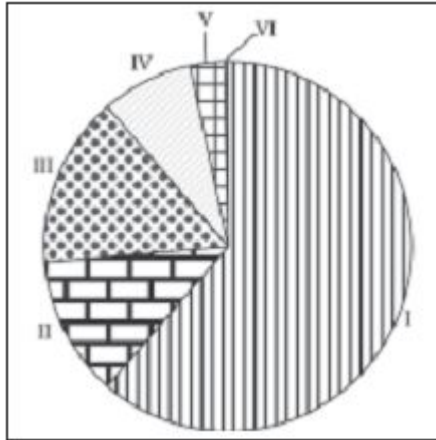
The second category of Towns (as in item 2 above) is known as Census Town. These were identified on the basis of Census 2001 data.

Number of UAs/Towns and Out Growths (OGs)

	Type of Towns/UAs/OGs	Number of towns	
		2011 Census	2001 Census
1	Statutory Towns	4,041	3,799
2	Census Towns	3,894	1,362
3	Urban Agglomerations	475	384
4	Out Growths	981	962

At the Census 2011 there are 7,935 towns in the country. The number of towns has increased by 2,774 since last Census. Many of these towns are part of UAs and the rest are independent towns. The total number of Urban Agglomerations/Towns, This constitutes the urban frame, is 6166 in the country.

Classification of Towns on the basis of Population Size



1. Census of India classifies urban centres into six classes
2. Urban centre with population of more than one lakh is called a city or class I town
3. Cities accommodating population size between one to five million are called metropolitan cities
4. More than five million are mega cities
5. Majority of metropolitan and mega cities are urban agglomerations

Functional Classification of Towns

Administrative towns and cities

- Towns supporting administrative headquarters of higher order are administrative towns, such as
- Chandigarh, New Delhi, Bhopal, Shillong, Guwahati, Imphal, Srinagar, Gandhinagar, Jaipur Chennai, etc.

Industrial towns

- Industries constitute prime motive force of these cities such as Mumbai, Salem, Coimbatore, Modinagar, Jamshedpur, Hugli, Bhilai, etc.

Transport Cities

- They may be ports primarily engaged in export and import activities
- Kandla, Kochchi, Kozhikode, Vishakhapatnam, etc.
- Hubs of inland transport such as
- Agra, Dhulia, Mughal Sarai, Itarsi, Katni,

Commercial towns

- Towns and cities specialising in trade and commerce are kept in this class.
- Kolkata, Saharanpur, Satna, etc.

Mining towns

- These towns have developed in mineral rich areas such as
- Raniganj
- Jharia
- Digboi
- Ankaleshwar
- Singrauli

Garrison Cantonment towns

- These towns emerged as garrison towns such as
- Ambala, Jalandhar, Mhow, Babina, Udhampur, etc.

Educational towns

- Starting as centres of education, some of the towns have grown into major campus towns
- Such as Roorki,
- Varanasi, Aligarh, Pilani, Allahabad etc.

Religious and cultural towns

- Varanasi, Mathura, Amritsar, Madurai, Puri, Ajmer, Pushkar, Tirupati, Kurukshetra, Haridwar, Ujjain came to prominence due to their religious/cultural significance
- Tourist towns
- Nainital, Mussoorie, Shimla, Pachmarhi, Jodhpur, Jaisalmer, Udagamandalam (Ooty), Mount Abu are some of the tourist destinations

Resource and Development

'Resource'

- It is technologically accessible, economically feasible and culturally acceptable can be termed as 'Resource'
- Resources are a function of human activities

These resources can be classified in the following ways

1. On the basis of origin – biotic and abiotic
2. On the basis of exhaustibility – renewable and non-renewable
3. On the basis of ownership – individual, community, national and international
4. On the basis of status of development – potential, developed stock and reserves

5. On the basis of status of development – potential, developed stock and reserves
6. On the Basis of Origin

Biotic Resources

- These are obtained from biosphere and have life such as human beings, flora and fauna, fisheries, livestock etc.

Abiotic Resources:

- All those things which are composed of non-living things are called abiotic resources. For example, rocks and metals.

On the Basis of Exhaustibility

Renewable Resources

1. The resources which can be renewed or reproduced by physical, chemical or mechanical processes are known as renewable or replenishable resources.
2. For example, solar and wind energy, water, forests and wildlife, etc.
3. The renewable resource may further be divided into continuous or flow

Non-Renewable Resources:

1. These occur over a very long geological time
2. Minerals and fossil fuels are examples of such resources

On the Basis of Ownership

1. Individual Resources
2. Community Owned Resources
3. National Resources
4. Technically, all the resources belong to the nation. The country has legal powers to acquire even private property for public good.
5. All the minerals, water resources, forests, wildlife, land within the political boundaries
6. Oceanic area up to 12 nautical miles (19.2 km)

International Resources

1. There are international institutions which regulate some resources
2. The oceanic resources beyond 200 km of the Exclusive Economic Zone
3. Belong to open ocean and no individual country can utilise these without the concurrence of international institutions
4. From that area which lies beyond the exclusive economic zone

Do you know that India has got the right to mine manganese nodules from the bed of the Indian Ocean.

On the Basis of the Status of Development

1. Resources which are found in a region, but have not been utilised
2. For example, the western parts of India particularly Rajasthan and Gujarat have enormous potential for the development of wind and solar energy
3. But so far these have not been developed properly

Developed Resources

1. Resources which are surveyed and their quality and quantity have been determined for utilisation
2. The development of resources depends on technology and level of their feasibility

Stock

1. Materials in the environment which have the potential to satisfy human needs but human beings do not have the appropriate technology to access these
2. For example, water is a compound of two inflammable gases; hydrogen and oxygen
3. Which can be used as a rich source of energy
4. But we do not have the required technical 'know-how' to use them for this purpose. Hence, it can be considered as stock

Reserves

1. Reserves are the subset of the stock, which can be put into use with the help of existing technical 'know-how' but their use has not been started.
2. These can be used for meeting future requirements
3. River water can be used for generating hydroelectric power but presently
4. Thus, the water in the dams, forests etc. is a reserve which can be used in the future

DEVELOPMENT OF RESOURCES

1. Resource planning is essential for sustainable existence of all forms of life. Sustainable existence is a component of sustainable development
2. Sustainable development
3. Sustainable economic development means 'development should take place without damaging the environment
4. And development in the present should not compromise with the needs of the future generations
5. Rio de Janeiro Earth Summit, 1992
6. In June 1992, more than 100 heads of states met in Rio de Janeiro in Brazil
7. For the first International Earth Summit.
8. Socioeconomic development at the global level

- The Rio Convention endorsed the global Forest Principles and adopted *Agenda 21* for achieving *Sustainable Development in the 21 st century*.
- **Agenda 21**
- *It is the declaration signed by world leaders in 1992 at the United Nations Conference on Environment and Development (UNCED)*
- Which took place at *Rio de Janeiro, Brazil*
- It aims at achieving global sustainable development.
- One major objective of the Agenda 21 is that every local government should draw its own local Agenda 21

RESOURCE PLANNING

1. The states of Jharkhand, Chhattisgarh and Madhya Pradesh are rich in minerals and coal deposits. Arunachal Pradesh has abundance of water resources but lacks in infrastructural development.
2. The state of Rajasthan is very well endowed with solar and wind energy but lacks in water resources

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Resource Planning in India

- Resource planning is a complex process which involves
- Identification and inventory of resources
- Evolving a planning structure
- Endowed with appropriate technology, skill and institutional set up for implementing resource development plans
- Matching the resource development plans with overall national development plans.

India has made concerted efforts for achieving the goals of resource planning right from the First Five Year Plan

Conservation of Resources

1. Irrational consumption and over-utilisation of resources may lead to socio-economic and environmental problems.
2. Gandhiji was very apt in voicing his concern about resource conservation in these words
3. "There is enough for everybody's need and not for any body's greed."
4. He was against mass production and wanted to replace it with the production by the masses
5. At the international level, the Club of Rome advocated resource conservation for the first time in a more systematic way in 1968
6. Subsequently, in 1974, Gandhian philosophy was once again presented by Schumacher in his book Small is Beautiful
7. The seminal contribution with respect to resource conservation at the global level was made by the Brundtland Commission Report, 1987
8. This report introduced the concept of 'Sustainable Development' and advocated it as a means for resource conservation
9. Which was subsequently published in a book entitled Our Common Future
10. Another significant contribution was made at the Earth Summit at Rio de Janeiro, Brazil in 1992.
11. However, land is an asset of a finite magnitude, therefore, it is important to use the available land for various purposes with careful planning
12. About 43 per cent of the land area is plain, which provides facilities for agriculture and industry
13. Mountains account for 30 per cent of the total surface area of the country and ensure perennial flow of some river
14. Provide facilities for tourism and ecological aspects. About 27 per cent of the area of the country is the plateau region.

LAND UTILISATION

- Forests
1. Land not available for cultivation
 - Barren and waste land
 - Land put to non-agricultural uses,
 2. Other uncultivated land (excluding fallow land)
 - Permanent pastures and grazing land,
 - Land under miscellaneous tree crops groves (not included in net sown area),
 - Culturable waste land (left uncultivated for more than 5 agricultural years).
 3. Fallow lands
 - Current fallow-(left without cultivation for one or less than one agricultural year),
 - Other than current fallow-(left uncultivated for the past 1 to 5 agricultural years)

Net sown area

- Area sown more than once in an agricultural year plus net sown area is known as gross cropped area

LAND USE PATTERN IN INDIA

4. Most of the other than the current fallow lands are either of poor quality or the cost of cultivation of such land is very high.
5. The pattern of net sown area varies greatly from one state to another
6. It is over 80 per cent of the total area in Punjab and Haryana
7. Less than 10 per cent in Arunachal Pradesh, Mizoram, Manipur and Andaman Nicobar Islands
8. Waste land includes rocky, arid and desert areas
9. Non-agricultural uses includes settlements, roads, railways, industry etc.

LAND DEGRADATION AND CONSERVATION MEASURES

1. Ninety-five per cent of our basic needs for food, shelter and clothing
2. At present, there are about 130 million hectares of degraded land in India
3. 28 per cent of it belongs to the category of forest degraded area
4. 56 per cent of it is water eroded area and the rest is affected by saline and alkaline deposits
5. States like Jharkhand, Chhattisgarh, Madhya Pradesh and Orissa deforestation due to mining have caused severe land degradation.
6. In states like Gujarat, Rajasthan, Madhya Pradesh and Maharashtra overgrazing is one of the main reasons for land degradation.
7. In the states of Punjab, Haryana, western Uttar Pradesh, over irrigation is responsible for land degradation
8. The mineral processing like grinding of limestone for cement industry and calcite and soapstone for ceramic industry generate huge quantity of dust in the atmosphere
9. Afforestation and proper management of grazing can help to some extent
10. Planting of shelter belts of plants, control on over grazing, stabilisation of sand dunes by growing thorny bushes are some of the methods to check land degradation.

SOIL AS A RESOURCE

1. Soil is the most important renewable natural resource.
2. The soil is a living system. It takes millions of years to form soil up to a few cm in depth.
3. Temperature, actions of running water, wind and glaciers, activities of decomposers etc. contribute to the formation of soil.

Minerals and Resources

- Most toothpaste are made white with titanium oxide, which comes from minerals called rutile, limonite and anatase
- The sparkle in some toothpaste comes from mica.

What is a mineral?

1. Geologists define mineral as a “homogenous, naturally occurring substance with a definable internal structure.
2. Minerals are found in varied forms in nature, ranging from the hardest diamond to the softest talc.
3. Rocks are combinations of homogenous substances called minerals

MODE OF OCCURRENCE OF MINERALS

1. Where are these minerals found?
2. Minerals are usually found in “ores”. The term ore is used to describe an accumulation of any mineral mixed with other elements.
3. Minerals generally occur in these forms:
4. In igneous and metamorphic rocks minerals may occur in the cracks, crevices, faults or joints.

5. The smaller occurrences are called veins
6. And the larger are called lodes.
7. In most cases, they are formed when minerals in liquid/ molten and gaseous forms are forced upward through cavities towards the earth's surface.
8. They cool and solidify as they rise.
9. Major metallic minerals like tin, copper, zinc and lead etc. are obtained from veins and lodes
10. In sedimentary rocks a number of minerals occur in beds or layers.
11. Formed as a result of deposition, accumulation and concentration in horizontal strata
12. Another mode of formation involves the decomposition of surface rocks,
13. And the removal of soluble constituents
14. Leaving a residual mass of weathered material containing ores
15. Bauxite is formed this way

Certain minerals may occur as alluvial deposits in sands of valley floors and the base of hills.

1. These deposits are called 'placer deposits
2. Generally contain minerals, which are not corroded by water
3. Gold, silver, tin and platinum are most important among such minerals.
4. The ocean waters contain vast quantities of minerals, but most of these are too widely diffused to be of economic significance.
5. However, common salt, magnesium and bromine are largely derived from ocean waters.
6. The ocean beds, too, are rich in manganese nodules.
7. India is fortunate to have fairly rich and varied mineral resources
8. Peninsular rocks contain most of the reserves of coal, metallic minerals, mica and many other non-metallic minerals.
9. Sedimentary rocks on the western and eastern flanks of the peninsula, in Gujarat and Assam have most of the petroleum deposits.
10. Rajasthan with the rock systems of the peninsula, has reserves of many non-ferrous minerals
11. The vast alluvial plains of north India are almost devoid of economic minerals. These variant
12. Ferrous Minerals
13. Ferrous minerals account for about three fourths of the total value of the production of metallic minerals.
14. They provide a strong base for the development of metallurgical industries.

Iron Ore

1. Iron ore is the basic mineral and the backbone of industrial development.
2. India is endowed with fairly abundant resources of iron ore
3. India is rich in good quality iron ores
4. Magnetite is the finest iron ore with a very high content of iron up to 70 per cent
5. Hematite ore is the most important industrial iron ore in terms of the quantity used,
6. Has slightly lower iron content than magnetite. (50-60 per cent)
7. Kudre in Kannada means horse. The highest peak in the western ghats of Karnataka resembles the face of a horse. The Bailadila hills look like the hump of an ox, and hence its name.

The major iron ore belts in India are:

1. Orissa-Jharkhand belt:
2. In Orissa high grade hematite ore is found in Badampahar mines in the Mayurbhanj and Kendujhar districts. In the adjoining Singhbhum district of Jharkhand haematite iron ore is mined in Goa and Noamundi.
3. Durg-Bastar-Chandrapur belt
4. Lies in Chhattisgarh and Maharashtra

5. Very high grade haematites are found in the famous Bailadila range of hills in the Bastar district of Chhattisgarh.
6. The range of hills comprise of 14 deposits of super high grade hematite iron ore.
7. It has the best physical properties needed for steel making
8. Iron ore from these mines is exported to Japan and South Korea via Vishakhapatnam port.
9. Bellary-Chitradurga-Chikmagalur-Tumkur belt in Karnataka has large reserves of iron ore
10. The Kudremukh mines located in the Western Ghats of Karnataka are a 100 per cent export unit
11. Kudremukh deposits are known to be one of the largest in the world
12. The ore is transported as slurry through a pipeline to a port near Mangalore.
13. Maharashtra-Goa belt includes the state of Goa and Ratnagiri district of Maharashtra.
14. Though, the ores are not of very high quality, yet they are efficiently exploited.
15. Iron ore is exported through Marmagao port

Manganese

1. Manganese is mainly used in the manufacturing of steel and ferro-manganese alloy
2. Nearly 10 kg of manganese is required to manufacture one tonne of steel.
3. It is also used in manufacturing bleaching powder, insecticides and paints.
4. Orissa is the largest producer of manganese ores in India.
5. It accounted for one-third of the country's total production in 2000-01

Non-Ferrous Minerals

India's reserves and production of non-ferrous minerals is not very satisfactory

However, these minerals, which include copper, bauxite, lead, zinc and gold play a vital role in a number of metallurgical, engineering and electrical industries

Copper

1. India is critically deficient in the reserve and production of copper.
2. Being malleable, ductile and a good conductor, copper is mainly used in electrical cables, electronics and chemical
3. The Balaghat mines in Madhya Pradesh produce 52 per cent of India's copper
4. The *Singbhum district of Jharkhand* is also a leading producer of copper.
5. *The Khetri mines in Rajasthan* are also famous.

Bauxite

1. Though, several ores contain aluminium, it is from bauxite, a clay-like substance that alumina and later aluminium is obtained
2. Bauxite deposits are formed by the decomposition of a wide variety of rocks rich in aluminium silicates
3. Aluminium is an important metal because it combines the strength
4. Of metals such as iron, with extreme lightness and also with good conductivity and great malleability.
5. India's bauxite deposits are mainly found in the Amarkantak plateau, Maikal hills and the plateau region of Bilaspur- Katni.
6. Orissa is the largest bauxite producing state in India with 45 per cent of the country's total production
7. In 2000-01. Panchpatmali deposits in Koraput district are the most important bauxite deposits in the state.

After the discovery of aluminium Emperor Napoleon III wore buttons and hooks on his clothes made of aluminium

Served food to his more illustrious guests in aluminium utensils

The less honourable ones were served in gold and silver utensils.

Thirty years after this incident aluminium bowls were most common with the beggars in Paris.

Non-Metallic Minerals

1. Mica is a mineral made up of a series of plates or leaves. It splits easily into thin sheets.
2. These sheets can be so thin that a thousand can be layered into a mica sheet of a few centimetres high.
3. Mica can be clear, black, green, red yellow or brown.
4. Due to its excellent di-electric strength, low power loss factor, insulating properties and resistance to high voltage, mica is one of the most indispensable minerals used in electric and electronic industries.
5. Mica deposits are found in the northern edge of the Chota Nagpur plateau
6. Koderma Gaya – Hazaribagh belt of Jharkhand is the leading producer.
7. In Rajasthan, the major mica producing area is around Ajmer. Nellore mica belt of Andhra Pradesh is also an important producer in the country.

Rock Minerals

1. Limestone is found in association with rocks composed of calcium carbonates or calcium and magnesium carbonates.
2. It is found in sedimentary rocks of most geological formations
3. Limestone is the basic raw material for the cement industry and essential for smelting iron ore in the blast furnace.

CONSERVATION OF MINERALS

1. The total volume of workable mineral deposits is an insignificant fraction i.e. one per cent of the earth's crust.
2. Required millions of years to be created and concentrated.
3. Mineral resources are, therefore, finite and non-renewable. Rich mineral deposits are our country's extremely valuable but short-lived possessions.
4. Improved technologies need to be constantly evolved to allow use of low grade ores at low costs
5. Improved technologies need to be constantly evolved to allow use of low grade ores at low costs

Energy Resources

1. Energy can be generated from fuel minerals like coal, petroleum, natural gas, uranium and from electricity
2. Energy resources can be classified as conventional and nonconventional sources
3. Conventional sources include: firewood, cattle dung cake, coal, petroleum, natural gas and electricity (both hydel and thermal)
4. Non-conventional sources include solar, wind, tidal, geothermal, biogas and atomic energy.
5. Firewood and cattle dung cake are most common in rural India. According to one estimate more than 70 per cent energy requirement in rural households is met by these two
6. Continuation of these is increasingly becoming difficult due to decreasing forest area

Conventional Sources of Energy

1. Coal: In India, coal is the most abundantly available fossil fuel. It provides a substantial part of the nation's energy needs. It is used for power generation,
2. Decaying plants in swamps produce peat. Which has a low carbon and high moisture contents and low heating capacity
3. Lignite is a low grade brown coal, which is soft with high moisture content
4. The principal lignite reserves are in Neyveli in Tamil Nadu and are used for generation of electricity.
5. Coal that has been buried deep and subjected to increased temperatures is bituminous coal.
6. It is the most popular coal in commercial use.
7. Metallurgical coal is high grade bituminous coal which has a special value for smelting iron in blast furnaces
8. Anthracite is the highest quality hard coal
9. In India coal occurs in rock series of two main geological ages, namely Gondwana, a little over 200 million years in age and in tertiary deposits which are only about 55 million years old.
10. Damodar valley (West Bengal-Jharkhand). Jharia, Raniganj, Bokaro are important coalfields.
11. The Godavari, Mahanadi, Son and Wardha valleys also contain coal deposits.
12. Tertiary coals occur in the north eastern states of Meghalaya, Assam, Arunachal Pradesh and Nagaland

Petroleum

1. Petroleum or mineral oil is the next major energy source in India after coal.
2. It provides fuel for heat and lighting, lubricants for machinery and raw materials for a number of manufacturing industries.
3. Act as a "nodal industry" for synthetic textile, fertiliser and numerous chemical industries
4. Most of the petroleum occurrences in India are associated with anticlines and fault traps in the rock formations of the tertiary age
5. In regions of folding, anticlines or domes, it occurs where oil is trapped in the crest of the upfold
6. The oil bearing layer is a porous limestone or sandstone through which oil may flow.
7. Petroleum is also found in fault traps between porous and non-porous rocks. Gas, being lighter usually occurs above the oil.
8. About 63 per cent of India's petroleum production is from Mumbai High, 18 per cent from Gujarat and 16 per cent from Assam
9. Digboi, Naharkatiya and Moran-Hugrijan are the important oil fields in the state.

Natural Gas

1. Natural gas is an important clean energy resource found in association with or without petroleum.
2. Natural gas is considered an environment friendly fuel because of low carbon dioxide emissions
3. Large reserves of natural gas have been discovered in the Krishna- Godavari basin.
4. The 1700 km long Hazira-BijaipurJagdishpur cross country gas pipeline links Mumbai High and Bassien with the fertilizer

Electricity

1. Electricity has such a wide range of applications in today's world that, it's per capita consumption is considered as an index of development
2. There are over 310 thermal power plants in India
3. Nuclear or Atomic Energy is obtained by altering the structure of atoms
4. Uranium and thorium, which are available in Jharkhand and the Aravali ranges of Rajasthan
5. Generating atomic or nuclear power. The Monazite sands of Kerala are also rich in thorium.
6. Non-Conventional Sources of Energy

7. The growing consumption of energy has resulted in the country becoming increasingly dependent on fossil fuels such as coal, oil and gas.
8. The growing consumption of energy has resulted in the country becoming increasingly dependent on fossil fuels such as coal, oil and gas.
9. India is a tropical country. It has enormous possibilities of tapping solar energy
10. Photovoltaic technology converts sunlight directly into electricity
11. The largest solar plant of India is located at Madhapur, near Bhuj, where solar energy is used to sterilise milk cans

Wind power

1. India now ranks as a “wind super power” in the world
2. The largest wind farm cluster is located in Tamil Nadu from Nagarcoil to Madurai
3. Apart from these, Andhra Pradesh, Karnataka, Gujarat, Kerala, Maharashtra and Lakshadweep have important wind farms. Nagarcoil and Jaisalmer are well known for effective use of wind energy in the country.

Biogas

1. Shrubs, farm waste, animal and human waste are used to produce biogas for domestic consumption in rural areas
2. Decomposition of organic matter yields gas, which has higher thermal efficiency

Tidal Energy

1. Oceanic tides can be used to generate electricity. Floodgate dams are built across inlets.
2. During high tide water flows into the inlet and gets trapped when the gate is closed.
3. After the tide falls outside the flood gate, the water retained by the floodgate flows back to the sea via a pipe that carries it through a power-generating turbine
4. In India, the Gulf of Kutch, provides ideal conditions for utilising tidal energy. A 900 mw tidal energy power plant is set up here by the National Hydropower Corporation

Geo Thermal Energy

1. Geothermal energy refers to the heat and electricity produced by using the heat from the interior of the Earth
2. Shallow depths. Groundwater in such areas absorbs heat from the rocks and becomes hot.
3. There are several hundred hot springs in India,
4. Two experimental projects have been set up in India to harness geothermal energy
5. Manikarn in Himachal Pradesh and the other is located in the Puga Valley, Ladakh.

MANUFACTURING INDUSTRIES

1. Production of goods in large quantities after processing from raw materials to more valuable products is called *manufacturing*.
2. The economic strength of a country is measured by the development of manufacturing industries.
3. Manufacturing sector is considered the backbone of development
4. India's prosperity lies in increasing and diversifying its manufacturing industries as quickly as possible

Contribution of Industry to National Economy

1. Over the last two decades, the share of manufacturing sector has stagnated at 17 per cent of GDP –
2. Out of a total of 27 per cent for the industry which includes 10 per cent for mining, quarrying, electricity and gas.
3. Where it is 25 to 35 per cent. The trend of growth rate in manufacturing over the last decade has been around 7 per cent per annum.
4. The desired growth rate over the next decade is 12 per cent.
5. With appropriate policy interventions by the government and renewed efforts by the industry to improve productivity,
6. The National Manufacturing Competitiveness Council (NMCC) has been set up with this objective.

Industrial Location

These are influenced by availability of raw material, labour, capital, power and market, etc.

Agglomeration economies

- Many industries tend to come together to make use of the advantages offered by the urban centres known as agglomeration economies

Classification of Industries

On the basis of source of raw materials used:

1. Agro based: cotton, woollen, jute, silk textile, rubber and sugar, tea, coffee, edible oil
2. Mineral based: iron and steel, cement, aluminium, machine tools, petrochemicals.

According to their main role

1. Basic or key industries which supply their products or raw materials to manufacture other goods e.g. iron and steel and copper smelting, aluminium smelting.

2. Consumer industries that produce goods for direct use by consumers – sugar, toothpaste, paper, sewing machines, fans etc.
3. A small scale industry is defined with reference to the maximum investment allowed on the assets of a unit.
4. This limit has changed over a period of time. At present the maximum investment allowed is rupees one crore

On the basis of ownership:

1. Public sector, owned and operated by government agencies – BHEL, SAIL etc.
2. Private sector industries owned and operated by individuals or a group of individuals – TISCO, Bajaj Auto Ltd., Dabur Industries
3. Joint sector industries which are jointly run by the state and individuals or a group of individuals. Oil India Ltd. (OIL) is jointly owned by public and private sector.
4. Cooperative sector industries are owned and operated by the producers or suppliers of raw materials, workers or both.
5. They pool in the resources and share the profits or losses proportionately such as the sugar industry in Maharashtra, the coir industry in Kerala.

Heavy industries such as iron and steel

1. Light industries that use light raw materials and produce light goods such as electrical industries.

Agro Based Industries

1. Cotton, jute, silk, woollen textiles, sugar and edible oil, etc. industry are based on agricultural raw materials.

Textile Industry

1. The textile industry occupies unique position in the Indian economy
2. It contributes significantly to industrial production (14 per cent), employment generation (35 million persons directly
3. The second largest after agriculture) and foreign exchange earnings (about 24.6 per cent).
4. It contributes 4 per cent towards GDP. It is the only industry in the country,
5. Which is self-reliant and complete in the value chain i.e., from raw material to the highest value added products

Cotton Textiles

1. In ancient India, cotton textiles were produced with hand spinning and handloom weaving techniques.
2. After the 18th century, power-looms came into use. Our traditional industries suffered a setback during the colonial period because they could not compete with the mill-made cloth from England.
3. Today, there are nearly 1600 cotton and human made fibre textile mills in the country.
4. The first successful textile mill was established in Mumbai in 1854.
5. The two world wars were fought in Europe, India was a British colony. There was a demand for cloth in U.K
6. Hence, they gave a boost to the development of the cotton textile industry.
7. In the early years, the cotton textile industry was concentrated in the cotton growing belt of Maharashtra and Gujarat
8. Availability of raw cotton, market, transport including accessible port facilities, labour, moist climate, etc.

9. Contributed towards its localisation
10. This industry has close links with agriculture and provides a living to farmers, cotton boll pluckers and workers engaged in
11. Ginning, spinning, weaving, dyeing, designing, packaging, tailoring and sewing.
12. The industry by creating demands supports many other industries, such as, chemicals and dyes, mill stores, packaging materials and engineering works.
13. While spinning continues to be centralised in Maharashtra, Gujarat and Tamil Nadu
14. Weaving is highly decentralised to provide scope for incorporating traditional skills and designs of weaving in cotton, silk, zari, embroidery, etc.
15. India has world class production in spinning, but weaving supplies low quality of fabric as it cannot use much of the high quality yarn produced in the country.
16. The handspun khadi provides large scale employment to weavers in their homes as a cottage industry.
17. India exports yarn to Japan. Other importers of cotton goods from India are U.S.A., U.K., Russia, France, East European countries, Nepal, Singapore, Sri Lanka, and African countries.
18. India has the second largest installed capacity of spindles in the world, next to China, at around 34 million (2003-04)
19. Since the mid-eighties, the spinning sector has received a lot of attention.
20. We have a large share in the world trade of cotton yarn, accounting for one fourth of the total trade
21. Our trade in garments is only 4 per cent of the world's total.
22. The weaving, knitting and processing units cannot use much of the high quality yarn that is produced in the country.
23. The weaving, knitting and processing units cannot use much of the high quality yarn that is produced in the country.
24. But most of the production is in fragmented small units,
25. This mismatch is a major drawback for the industry.

Jute Textiles

1. India is the largest producer of raw jute and jute goods and stands at second place as an exporter after Bangladesh.
2. There are about 70 jute mills in India.
3. Most of these are located in West Bengal, mainly along the banks of the Hugli River, in a narrow belt (98 km long and 3 km wide).
4. The first jute mill was set up near Kolkata in 1859 at Rishra
5. After Partition in 1947, the jute mills remained in India but three-fourth of the jute producing area went to Bangladesh (erstwhile East Pakistan).
6. Factors responsible for their location in the Hugli basin are: proximity of the jute producing areas, inexpensive water transport, supported by a good network of railways,
7. roadways and waterways to facilitate movement of raw material to the mills, abundant water for processing raw jute, cheap labour from West Bengal and adjoining states of Bihar, Orissa and Uttar Pradesh.
8. Kolkata as a large urban centre provides banking, insurance and port facilities for export of jute goods
9. The jute industry supports 2.61 lakh workers directly and another 40 lakhs small and marginal farmers who are engaged in cultivation of jute and Mesta.
10. Challenges faced by the industry include stiff competition in the international market from synthetic substitutes and from other competitors like Bangladesh, Brazil, Philippines, Egypt and Thailand.
11. However, the internal demand has been on the increase due to the Government policy of mandatory use of jute packaging.
12. And, the products need to be diversified. In 2005, National Jute Policy was formulated with the objective of increasing productivity,
13. Improving quality, ensuring good prices to the jute farmers and enhancing the yield per hectare.
14. The main markets are U.S.A., Canada, Russia, United Arab Republic, U.K. and Australia.

Sugar Industry

1. India stands second as a world producer of sugar but occupies the first place in the production of gurand khandsari.
2. The raw material used in this industry is bulky, and in haulage its sucrose content reduces.
3. There are over 460 sugar mills in the country spread over Uttar Pradesh, Bihar, Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh and Gujarat along with Punjab, Haryana and Madhya Pradesh.
4. Sixty per cent mills are in Uttar Pradesh and Bihar.
5. This industry is seasonal in nature so, it is ideally suited to the cooperative sector.
6. In recent years, there is a tendency for the mills to shift and concentrate in the southern and western states, especially in Maharashtra
7. This is because the cane produced here has a higher sucrose content.
8. The cooler climate also ensures a longer crushing season.
9. Moreover, the cooperatives are more successful in these states.
10. Major challenges include the seasonal nature of the industry
11. Old and inefficient methods of production, transport delay in reaching cane to factories and the need to maximise the use of baggase.
12. Industries that use minerals and metals as raw materials are called mineral based industries

Iron and Steel Industry

1. The iron and steel Industry is the basic industry since all the other industries — heavy, medium and light, depend on it for their machinery.
2. Steel is needed to manufacture a variety of engineering goods, construction material, defence, medical, telephonic, scientific equipment and a variety of consumer goods.
3. Production and consumption of steel is often regarded as the index of a country's development.
4. Iron and steel is a heavy industry because all the raw materials as well as finished goods are heavy and bulky entailing heavy transportation costs.
5. Iron ore, coking coal and lime stone are required in the ratio of approximately 4: 2: 1.
6. Some quantities of manganese, are also required to harden the steel.
7. Today with 32.8 million tons of steel production, India ranks ninth among the world crude steel producers.
8. It is the largest producer of sponge iron. In spite of large quantity of production of steel, per capita consumption per annum is only 32 kg.
9. Presently, there are 10 primary integrated and many mini steel plants in India.
10. All public sector undertakings market their steel through, Steel Authority of India Ltd. (SAIL) while TISCO markets its produce through Tata Steel.
11. In the 1950s China and India produced almost the same quantity of steel.
12. In 2004, India was the largest exporter of steel which accounted for 2.25 per cent of the global steel trade.
13. In 2004, India was the largest exporter of steel which accounted for 2.25 per cent of the global steel trade.
14. It is largely, because of the relative advantages this region has for the development of this industry.
15. These include, low cost of iron ore, high grade raw materials in proximity, cheap labour and vast growth potential in the home market.
16. Though, India is an important iron and steel producing country in the world yet, we are not able to perform to our full potential largely due to
 - High costs and limited availability of coking coal
 - Lower productivity of labour
 - Irregular supply of energy and
 - Poor infrastructure.

Aluminium Smelting

1. Aluminium smelting is the second most important metallurgical industry in India.
2. It is used to manufacture aircraft, utensils and wires.
3. There are 8 aluminium smelting plants in the country located in
 - Orissa (Nalco and Balco)
 - West Bengal
 - Kerala
 - Uttar Pradesh
 - Chhattisgarh
 - Maharashtra
 - Tamil Nadu
4. In 2004, India produced over 600 million tons of aluminium
5. Bauxite, the raw material used in the smelters is a very bulky, dark reddish coloured rock.
6. Regular supply of electricity and an assured source of raw material at minimum cost are the two prime factors for location of the industry.

Chemical Industries

1. The Chemical industry in India is fast growing and diversifying
2. It contributes approximately 3 per cent of the GDP
3. It is the third largest in Asia and occupies the twelfth place in the world in term of its size.
4. It comprises both large and small scale manufacturing units
5. Rapid growth has been recorded in both inorganic and organic sectors.
6. Inorganic chemicals include sulphuric acid (used to manufacture fertilisers, synthetic fibres, plastics, adhesives, paints, dyes stuffs), nitric acid, alkalies, soda ash (used to make glass, soaps and detergents, paper) and caustic soda.
7. Organic chemicals include petrochemicals, which are used for manufacturing of synthetic fibers, synthetic rubber, plastics, dye-stuffs, drugs and pharmaceuticals.
8. Organic chemical plants are located near oil refineries or petrochemical plants.
9. The chemical industry is its own largest consumer
10. Basic chemicals undergo processing to further produce other chemicals that are used for industrial application
11. Agriculture or directly for consumer markets.
12. The fertiliser industry is centred on the production of nitrogenous fertilisers (mainly urea), phosphatic fertilisers and ammonium phosphate (DAP)
13. Complex fertilisers which have a combination of nitrogen (N), phosphate (P), and potash (K).
14. The third, i.e. potash is
15. Entirely imported as the country does not have any reserves of commercially usable potash or potassium compounds in any form.
16. India is the third largest producer of nitrogenous fertilisers.
17. There are 57 fertiliser units manufacturing nitrogenous and complex nitrogenous fertilisers
18. 29 for urea and 9 for producing ammonium sulphate as a by-product and 68 other small units produce single superphosphate
19. At present, there are 10 public sector undertakings and one in cooperative sector at Hazira in Gujarat under the Fertiliser Corporation of India.
20. Gujarat, Tamil Nadu, Uttar Pradesh, Punjab and Kerala contribute towards half the fertiliser production.
21. Other significant producers are Andhra Pradesh, Orissa, Rajasthan, Bihar, Maharashtra, Assam, West Bengal, Goa, Delhi, Madhya Pradesh and Karnataka.

Cement Industry

1. Cement is essential for construction activity such as building houses, factories, bridges, roads, airports, dams and for other commercial establishments.
2. This industry requires bulky and heavy raw materials like limestone, silica, alumina and gypsum.
3. Coal and electric power are needed apart from rail transportation
4. The first cement plant was set up in Chennai in 1904
5. After Independence the industry expanded. Decontrol of price and distribution since 1989 and other policy reforms led the cement industry
6. To make rapid strides in capacity, process, technology and production.
7. There are 128 large plants and
8. 332 mini cement plants in the country.
9. Improvement in the quality has found the produce a readily available market in East Asia, Middle East, Africa and South Asia apart from a large demand within the country
10. This industry is doing well in terms of production as well as export.

Automobile Industry

1. Automobiles provide vehicle for quick transport of good services and passengers.
2. Trucks, buses, cars, motor cycles, scooters, three-wheelers and multi-utility vehicles are manufactured in India at various centres.
3. After the liberalisation, the coming in of new and contemporary models stimulated the demand for vehicles in the market
4. This led to the healthy growth of the industry including passenger cars, two and three-wheelers.
5. This industry had experienced a quantum jump in less than 15 years.
6. Foreign Direct Investment brought in new technology and aligned the industry with global developments.
7. At present, there are 15 manufacturers of passenger cars and multiutility vehicles, 9 of commercial vehicles, 14 of the two and three-wheelers.

Information Technology and Electronics Industry

1. The electronics industry covers a wide range of products from transistor sets to television, telephones, cellular telecom, pagers, telephone exchange, radars, computers and many other equipment's required by the telecommunication industry.
2. Bangalore has emerged as the electronic capital of India
3. Other important centres for electronic goods are Mumbai, Delhi, Hyderabad, Pune, Chennai, Kolkata, Lucknow and Coimbatore.
4. 18 software technology parks provide single window service and high data communication facility to software experts.
5. . It is encouraging to know that 30 per cent of the people employed in this sector are women.
6. This industry has been a major foreign exchange earner in the last two or three years because of its fast growing Business Processes Outsourcing (BPO) sector.
7. The continuing growth in the hardware and software is the key to the success of IT industry in India.
8. Industrial Pollution and Environmental Degradation

Roadways

1. Aggregating to about 2.3 million km at present.
2. In India, roadways have preceded railways.
3. They still have an edge over railways in view of the ease with which they can be built and maintained.
4. In India, roads are classified in the following six classes according to their capacity

Golden Quadrilateral Super Highways

1. The government has launched a major road development project linking Delhi-Kolkata Chennai-Mumbai and Delhi. By six-lane Super Highways.
2. The North-South corridors linking Srinagar (Jammu & Kashmir) and Kanyakumari (Tamil Nadu),
3. And East-West Corridor connecting Silchar (Assam) and Porbandar (Gujarat) are part of this project
4. These highway projects are being implemented by the National Highway Authority of India (NHAI).

National Highways

- National Highways link extreme parts of the country
- These are the primary road systems and are laid and maintained by the Central Public Works Department (CPWD).

- The historical Sher Shah Suri Marg is called National Highway No.1 between Delhi and Amritsar.

Do you know?

National Highway-7 is the longest and traverses 2,369 km between Varanasi and Kanyakumari

Via Jabalpur, Nagpur, Hyderabad, Bangalore and Madurai

Delhi and Mumbai are connected by National Highway-8, while National Highway-15 covers most of Rajasthan.

State Highways

1. Roads linking a state capital with different district headquarters are known as State Highways.
2. These roads are constructed and maintained by the State Public Works Department (PWD) in State and Union Territories.

District Roads

- These roads connect the district headquarters with other places of the district. These roads are maintained by the Zila Parishad.

Other Roads

- Rural roads, which link rural areas and villages with towns, are classified under this category
- These roads received special impetus under the Pradhan Mantri Grameen Sadak Yojana
- Under this scheme special provisions are made so that every village in the country is linked to a major town in the country by an all season motorable road.

Border Roads

1. Apart from these, Border Roads Organisation a Government of India undertaking constructs and maintains roads in the bordering areas of the country.
2. This organisation was established in 1960 for the development of the roads of strategic importance in the northern and north-eastern border areas.

Road Density

1. The length of road per 100 sq. km of area is known as density of roads.
2. Distribution of road is not uniform in the country.
3. Density of all roads varies from only 10 km in Jammu & Kashmir to 375 km in Kerala with the national average of 75 km (1996-97).

Railways

1. The Indian Railway have a network of 7,031 stations spread over a route length of 63,221 km.
2. with a fleet of 7817 locomotives, 5321 passenger service vehicles, 4904 other coach vehicles and 228,170 wagons as on 31 March 2004.
3. The Indian Railways is the largest public sector undertaking in the country.
4. The first train steamed off from Mumbai to Thane in 1853, covering a distance of 34 km.
5. The Indian Railway network runs on multiple gauge operations

<u>Gauge in metres</u>	<u>Route (Km)</u>	<u>Running Track (Km)</u>	<u>Total Track (Km.)</u>
Broad Gauge (1.676)	46,807	66,754	88,547

Metro Gauge (1.000)	13, 209	13, 976	16, 489
Narrow Gauge (0.762 & 0.610)	3, 124	3, 129	3, 450

6. The Indian Railway is now reorganised into 16 zones

Pipelines

1. Pipeline transport network is a new arrival on the transportation map of India.
2. There are three important networks of pipeline transportation in the country.
3. From oil field in upper Assam to Kanpur (Uttar Pradesh), via Guwahati, Barauni and Allahabad.
4. It has branches from Barauni to Haldia, via Rajbandh, Rajbandh to Maurigram and Guwahati to Siliguri.
5. From Salaya in Gujarat to Jalandhar in Punjab, via Viramgam, Mathura, Delhi and Sonipat.
6. It has branches to connect Koyali (near Vadodara, Gujarat) Chakshu and other places.
7. Gas pipeline from Hazira in Gujarat connects Jagdishpur in Uttar Pradesh, via Vijaipur in Madhya Pradesh
8. It has branches to Kota in Rajasthan, Shahajahanpur, Babrala and other places in Uttar Pradesh.

Waterways

1. Waterways are the cheapest means of transport
2. They are most suitable for carrying heavy and bulky goods.
3. It is a fuel-efficient and environment friendly mode of transport.
4. India has inland navigation waterways of 14,500 km in length.
5. Out of these only 3,700 km are navigable by mechanised boats.
6. The following waterways have been declared as the National Waterways by the Government.
7. The Ganga River between Allahabad and Haldia (1620 km)-N.W. No.1
8. The Brahmaputra River between Sadiya and Dhubri (891 km)-N.W. No.2
9. The West-Coast Canal in Kerala (Kottapurma-Komman, Udyogamandal and Champakkara canals-205 km) – N.W. No.3
10. The other viable inland waterways include the Godavari, Krishna, Barak, Sunderbans, Buckingham Canal, Brahmani, East-west Canal and Damodar Valley Corporation Canal.
11. 95 per cent of the country's trade volume (68 per cent in terms of value) is moved by sea.

Major Sea Ports

1. With a long coastline of 7,516.6 km, India is dotted with 12 major and 181 medium and minor ports.
2. These major ports handle 95 per cent of India's foreign trade. Kandla in Kuchchh w
3. Kandla in Kuchchh was the first port developed soon after Independence to ease the volume of trade on the Mumbai port,
4. In the wake of loss of Karachi port to Pakistan after the Partition
5. Kandla is a tidal port. It caters to the convenient handling of exports and imports of
6. highly productive granary and industrial belt stretching across the states of Jammu and Kashmir, Himachal Pradesh, Punjab, Haryana, Rajasthan and Gujarat.
7. Mumbai is the biggest port with a spacious natural and well-sheltered harbour.
8. The Jawaharlal Nehru port was planned with a view to decongest the Mumbai port and serve as a
9. Hub port for this region
10. Marmagao port (Goa) is the premier iron ore exporting port of the country.
11. This port accounts for about fifty per cent of India's iron ore export
12. New Mangalore port, located in Karnataka caters to the export of iron ore concentrates from Kudremukh mines.

13. Kochi is the extreme south-western port, located at the entrance of a lagoon with a natural harbour.
14. Along the east coast,
15. The extreme south-eastern port of Tuticorin, in Tamil Nadu.
16. This port has a natural harbour and rich hinterland
17. Thus, it has a flourishing trade handling of a large variety of cargoes to even our neighbouring countries like Sri Lanka, Maldives, etc.
18. Chennai is one of the oldest artificial ports of the country.
19. It is ranked next to Mumbai in terms of the volume of trade and cargo.
20. Vishakhapatnam is the deepest landlocked and well-protected port
21. This port was, originally, conceived as an outlet for iron ore exports
22. Paradip port located in Orissa, specialises in the export of iron ore
23. This port serves a very large and rich hinterland of Ganga- Brahmaputra basin
24. Being a tidal port, it requires constant dredging of Hoogly.
25. Haldia port was developed as a subsidiary port, in order to relieve growing pressure on the Kolkata port.

Airways

1. The air transport was nationalised in 1953
2. Indian Airlines, Alliance Air (subsidiary of Indian Airlines), private scheduled airlines and non-scheduled operators provide domestic air services.
3. Air India provides international air services
4. Pawanhans Helicopters Ltd. provides helicopter services to Oil and Natural Gas Commission in its off-shore operations,
5. To inaccessible areas and difficult terrains like the north-eastern states and the interior parts of Jammu and Kashmir,
6. It is only in the north-eastern states that special provisions are made to extend the services to the common people.

Communication

1. To facilitate quick delivery of mails in large towns and cities
2. Six mail channels have been introduced recently
3. They are called Rajdhani Channel, Metro Channel, and Green Channel
4. Business Channel, Bulk Mail Channel and Periodical Channel
5. Mass communication provides entertainment and creates awareness among people about various national programmes and policies.
6. All India Radio (Akashwani) broadcasts a variety of programmes in national, regional and local languages for various categories of people, spread over different parts of the country
7. Doordarshan, the national television channel of India, is one of the largest terrestrial networks in the world.
8. It broadcasts a variety of programmes from entertainment, educational to sports, etc. for people of different age groups
9. The largest number of newspapers published in the country are in Hindi, followed by English and Urdu
10. India is the largest producer of feature films in the world
11. It produces short films; video feature films and video short films
12. The Central Board of Film Certification is the authority to certify both Indian and foreign films

International Trade

1. The exchange of goods among people, states and countries is referred to as trade
2. The exchange of goods among people, states and countries is referred to as trade
3. It may take place through sea, air or land routes.

4. Advancement of international trade of a country is an index to its economic prosperity.
5. It is, therefore, considered the economic barometer for a country.
6. Among the commodities of export,
 - Agriculture and allied products
 - Ores and minerals
 - Gems and jewellery
 - Chemical and allied products
 - Engineering goods
 - Petroleum products
7. The commodities imported to India include
 - Petroleum and petroleum products
 - Gems and precious stones
 - Inorganic chemicals
 - Coal, coke and briquettes
 - Machinery
 - Bulk imports as a group registered a growth accounting for 39.09 per cent of total imports.
 - This group includes
 - Fertilizers
 - Cereals
 - Edible oils
 - Newsprint
8. India has emerged as a software giant at the international level and it is earning large foreign exchange through the export of information technology.

Tourism as a Trade

9. Tourism in India has grown substantially over the last three decades
10. Foreign tourist's arrivals in the country witnessed an increase of 23.5 per cent during the year 2004
11. As against the year 2003, thus contributing Rs 21,828 crore of foreign exchange.
12. Over 2.6 million foreign tourists visit India every year.
13. More than 15 million people are
14. Directly engaged in the tourism industry.
15. Tourism also promotes national integration, provides support to local handicrafts and cultural pursuits.
16. Foreign tourists visit India for heritage tourism, eco-tourism, adventure tourism, cultural tourism, medical tourism and business tourism.
17. Rajasthan, Goa, Jammu and Kashmir and temple towns of south India are important destinations of foreign tourists in India.
18. There is vast potential of tourism development in the north-eastern states and the interior parts of Himalayas,
19. But due to strategic reasons these have not been encouraged so far.

MINERAL AND ENERGY RESOURCES

- A mineral is a natural substance of organic or inorganic origin with definite chemical and physical properties.

Types of Mineral Resources

1. On the basis of chemical and physical properties, minerals may be grouped under two main categories of metallic and non-metallic
2. Metallic minerals are the sources of metals. Iron ore, copper, gold produce metal
3. Metallic minerals are further divided into ferrous and non-ferrous metallic minerals
4. Ferrous Refers to iron
5. All those minerals which have iron content are ferrous such as iron ore itself
6. Those which do not have iron content are non-ferrous such as copper, bauxite, etc.
7. Non-metallic minerals are either organic in origin such as fossil fuels also known as mineral fuels
8. Which are derived from the buried animal and plant life such as coal and petroleum
9. Good quality minerals are less in quantity as compared to low quality minerals
10. All minerals are exhaustible over time.
11. These take long to develop geologically and they cannot be replenished immediately at the time of need

Agencies involved in the exploration of minerals

1. In India, systematic surveying, prospecting and exploration for minerals is undertaken by the Geological Survey of India (GSI)
2. Oil and Natural Gas Commission (ONGC)
3. Mineral Exploration Corporation Ltd. (MECL)
4. National Mineral Development Corporation (NMDC)
5. Indian Bureau of Mines (IBM)
6. Bharat Gold Mines Ltd. (BGML)
7. Hindustan Copper Ltd. (HCL)
8. National Aluminium Company Ltd. (NALCO)
9. The Departments of Mining and Geology in various states

Distribution of Minerals in India

1. Most of the metallic minerals in India occur in the peninsular plateau region in the old crystalline rocks
2. Over 97 per cent of coal reserves occur in the valleys of Damodar, Sone, Mahanadi and Godavari.
3. Petroleum reserves are located in the sedimentary basins of Assam, Gujarat and Mumbai High i.e. off-shore region in the Arabian Sea.
4. Krishna-Godavari and Kaveri basins.
5. Most of the major mineral resources occur to the east of a line linking Mangalore and Kanpur.
6. Minerals are generally concentrated in three broad belts in India.

The North-Eastern Plateau Region

1. This belt covers Chotanagpur (Jharkhand), Orissa Plateau, West Bengal and parts of Chhattisgarh.
2. It has variety of minerals viz. iron ore coal, manganese, bauxite, mica.

The South-Western Plateau Region

1. This belt extends over Karnataka, Goa and contiguous Tamil Nadu uplands and Kerala.
2. This belt is rich in ferrous metals and bauxite.
3. It also contains high grade iron ore, manganese and limestone.
4. This belt packs in coal deposits except Neyveli lignite. This belt does
5. This belt does not have as diversified mineral deposits as the north-eastern belt.
6. Kerala has deposits of monazite and thorium, bauxite clay. Goa has iron ore deposits.

The North-Western Region

1. This belt extends along Aravali in Rajasthan and part of Gujarat and minerals are associated with Dharwar system of rocks.
2. Copper, zinc have been major minerals. Rajasthan is rich in building stones i.e. sandstone, granite, marble.
3. Gypsum and Fuller's earth deposits are also extensive
4. Dolomite and limestone provide raw materials for cement industry
5. Gujarat is known for its petroleum deposits.
6. Gujarat and Rajasthan both have rich sources of salt.
7. The Himalayan belt is another mineral belt where copper, lead, zinc, cobalt and tungsten are known to occur.
8. They occur on both the eastern and western parts.
9. Assam valley has mineral oil deposits. Besides oil resources are also found in off-shore-areas near Mumbai Coast (Mumbai High).

Ferrous Mineral

1. Ferrous minerals such as iron ore, manganese, chromite, etc., provide a strong base for the development of metallurgical industries.
2. Our country is well-placed in respect of ferrous minerals both in reserves and production.

Iron Ore

1. It has the largest reserve of iron ore in Asia.
2. The two main types of ore found in our country are haematite and magnetite.
3. It has great demand in international market due to its superior quality.
4. The iron ore mines occur in close proximity to the coal fields in the
5. North-eastern plateau region of the country which adds to their advantage.
6. The total reserves of iron ore in the country were about 20 billion tonnes in the year 2004-05.
7. About 95 per cent of total reserves of iron ore is located in the States of Orissa, Jharkhand, Chhattisgarh, Karnataka, Goa, Andhra Pradesh and Tamil Nadu.
8. In Orissa, iron ore occurs in a series of hill ranges in Sundergarh, Mayurbhanj and Jhar.
9. The important mines are Gurumahisani, Sulaipet, Badampahar (Mayurbhaji), Kiruburu (Kendujhar) and Bonai (Sundergarh).
10. Similar hill ranges, Jharkhand has some of the oldest
11. Iron ore mines and most of the iron and steel plants are located around them.
12. Most of the important mines such as Noamundi and Gua are located in Poorbi and Pashchimi Singhbhum districts.
13. This belt further extends to Durg, Dantewara and Bailadila.

14. Dalli, and Rajhara in Durg are the important mines of iron ore in the country
15. In Karnataka, iron ore deposits occur in Sandur-Hospet area of Bellary district,
16. Baba Budan hills and Kudremukh in Chikmagalur district and parts of Shimoga, Chitradurg and Tumkur districts.
17. The districts of Chandrapur, Bhandara and Ratnagiri in Maharashtra,
18. Salem and Nilgiris districts of Tamil Nadu are other iron mining regions.
19. Goa has also emerged as an important producer of iron ore.

Manganese

1. Manganese is an important raw material for smelting of iron ore and also used for manufacturing ferro alloys.
2. It is mainly associated with Dharwar system.
3. Orissa is the leading producer of Manganese
4. Major mines in Orissa are located in the central part of the iron ore belt of India,
5. Particularly in Bonai, Kendujhar, Sundergarh, Gangpur, Koraput, Kalahandi and Bolangir.
6. Karnataka is another major producer and here the mines are located in Dharwar, Bellary, Belgaum, North Canara, Chikmagalur, Shimoga, Chitradurg and Tumkur.
7. Maharashtra is also an important producer of manganese which is mined in Nagpur, Bhandara and Ratnagiri districts.
8. The disadvantage to these mines is that they are located far from steel plants.
9. The manganese belt of Madhya Pradesh extends in a belt in Balaghat-Chhindwara-Nimar-Mandla and Jabua districts.
10. Andhra Pradesh, Goa, and Jharkhand are other minor producers of manganese.
11. India is poorly endowed with non-ferrous metallic minerals except bauxite.

Bauxite

1. Bauxite is the ore which is used in manufacturing of aluminium.
2. Bauxite is found mainly in tertiary deposits and is associated with laterite rocks
3. Occurring extensively either on the plateau or hill ranges of peninsular India and also in the coastal tracts of the country
4. Orissa happens to be the largest producer of Bauxite
5. Kalahandi and Sambalpur are the leading producers
6. The other two areas which have been increasing their production are Bolangir and Koraput.
7. The patlands of Jharkhand in Lohardaga have rich deposits
8. Gujarat, Chhattisgarh, Madhya Pradesh and Maharashtra are other major producers.
9. Bhavanagar, Jamnagar in Gujarat have the major deposits.
10. Chhattisgarh has bauxite deposits in Amarkantak plateau while Katni-Jabalpur area and Balaghat in M.P. have important deposits of bauxite.
11. Kolaba, Thane, Ratnagiri, Satara, Pune and Kolhapur in Maharashtra are important producers.
12. Tamil Nadu, Karnataka and Goa are minor producers of bauxite.

Copper

1. Copper is an indispensable metal in the electrical industry for making wires, electric motors, transformers and generators.
2. It is alloy able, malleable and ductile. It is also mixed with gold to provide strength to jewellery.
3. The Copper deposits mainly occur in Singhbhum district in Jharkhand, Balaghat district in Madhya Pradesh and Jhunjhunu and Alwar districts in Rajasthan.
4. Minor producers of Copper are Agnigundala in Guntur District (Andhra Pradesh)
5. Chitradurg and Hasan districts (Karnataka) and South Arcot district (Tamil Nadu).

6. Non-metallic Minerals
7. Among the non-metallic minerals produced in India, mica is the important one
8. The other minerals extracted for local consumption are limestone, dolomite and phosphate.

Mica

1. Mica is mainly used in the electrical and electronic industries
2. It can be split into very thin sheets which are tough and flexible
3. Mica in India is produced in Jharkhand, Andhra Pradesh and Rajasthan followed by Tamil Nadu, West Bengal and Madhya Pradesh
4. In Jharkhand high quality mica is obtained in a belt extending over a distance of about 150 km, in length and about 22 km, in width in lower Hazaribagh plateau
5. In Andhra Pradesh. Nellore district produces the best quality mica.
6. In Rajasthan mica belt extends for about 320 kms from Jaipur to Bhilwara and around Udaipur.
7. Mica deposits also occur in Mysore and Hasan districts of Karnataka,
8. Coimbatore, Tiruchirappalli, Madurai and Kanyakumari in Tamil Nadu,
9. Alleppey in Kerala, Ratnagiri in Maharashtra, Purulia and Bankura in West Bengal

Energy Resources

1. Mineral fuels like coal, petroleum and natural gas (known as fossil fuels),
2. Nuclear energy minerals, are the Conventional sources of energy.
3. These conventional sources are exhaustible resources.

Coal

1. Coal is one of the important minerals which is mainly used in the generation of thermal power and smelting of iron ore.
2. Coal occurs in rock sequences mainly of two geological ages, namely Gondwana and tertiary deposits
3. About 80 per cent of the coal deposits in India is of bituminous type and is of non-coking grade.
4. The most important Gondwana coal fields of India are located in Damodar Valley.
5. They lie in Jharkhand-Bengal coal belt and the important coal fields in this region are Raniganj, Jharia, Bokaro, Giridih, and Karanpura.
6. Jharia is the largest coal field followed by Raniganj
7. The other river valleys associated with coal are Godavari, Mahanadi and Sone
8. The most important coal mining centres are Singrauli in Madhya Pradesh (part of Singrauli coal field lies in Uttar Pradesh)
9. Korba in Chhattisgarh, Talcher and Rampur in Orissa
10. Chanda-Wardha, Kamptee and Bander in Maharashtra and Singareni and Pandur in Andhra Pradesh.
11. It is extracted from Darangiri, Cherrapunji, Mawlong and Langrin (Meghalaya)
12. Makum, Jaipur and Nazira in upper Assam
13. Namchik – Namphuk (Arunachal Pradesh)
14. Kalakot (Jammu and Kashmir)
15. The brown coal or lignite occurs in the coastal areas of Tamil Nadu, Pondicherry, Gujarat and Jammu and Kashmir.

Petroleum

1. It is an essential source of energy for all internal combustion engines in automobiles, railways and aircraft.
2. Its numerous by-products are processed in petrochemical industries such as fertiliser, synthetic rubber, synthetic fibre, medicines, Vaseline, lubricants, wax, soap and cosmetics
3. Petroleum is referred to as liquid gold because of its scarcity and diversified uses.
4. Crude petroleum occurs in sedimentary rocks of the tertiary period

5. Oil exploration and production was systematically taken up after the Oil and Natural Gas Commission was set up in 1956
6. Till then, the Digboi in Assam was the only oil producing region but the scenario has changed after 1956
7. In recent years, new oil deposits have been found at the extreme western and eastern parts of the country
8. In Assam, Digboi, Naharkatiya and Moran are important oil producing areas.
9. The major oil fields of Gujarat are Ankaleshwar, Kalol, Mehsana, Nawagam, Kosamba and Lunej.
10. Mumbai High which lies 160 km off Mumbai was discovered in 1973, production commenced in 1976
11. Oil and natural gas have been found in exploratory wells in Krishna-Godavari and Kaveri basin on the east coast
12. Oil extracted from the wells is crude oil and contains many impurities
13. It cannot be used directly. It needs to be refined
14. There are two types of refineries in India:
 - (a) Field based
 - (b) Market based
15. Digboi is an example of field base
16. Barauni is an example of market based refinery
17. There are 18 refineries in India

Natural Gas

1. The Gas Authority of India Limited was set up in 1984 as a public sector undertaking to transport and market natural gas.
2. It is obtained along with oil in all the oil fields but exclusive reserves have been located along
3. The eastern coast as well as (Tamil Nadu, Orissa and Andhra Pradesh), Tripura, Rajasthan and off-shore wells in Gujarat and Maharashtra.

Nuclear Energy Resources

1. Nuclear energy has emerged as a viable source in recent times
2. Important minerals used for the generation of nuclear energy are uranium and thorium
3. Uranium deposits occur in the Dharwar rocks.
4. Geographically, uranium ores are known to occur in several locations along the Singhbhum Copper belt.
5. It is also found in Udaipur, Alwar and Jhunjhunu districts of Rajasthan
6. Durg district of Chhattisgarh,
7. Bhandara district of Maharashtra and Kullu district of Himachal Pradesh.
8. Thorium is mainly obtained from monazite and limonite in the beach sands
9. The coast of Kerala and Tamil Nadu
10. World's richest monazite deposits occur in Palakkad and Kollam districts of Kerala
11. Near Vishakhapatnam in Andhra Pradesh and Mahanadi river delta in Orissa.
12. Atomic Energy Commission was established in 1948, progress could be made only after
13. The establishment of the Atomic Energy Institute at Trombay in 1954 which was renamed as the Bhabha Atomic Research Centre in 1967.
14. The important nuclear power projects are Tarapur (Maharashtra), Rawatbhata near Kota (Rajasthan), Kalpakkam (Tamil Nadu), Narora (Uttar Pradesh), Kaiga (Karnataka) and Kakrapar (Gujarat).

Non-Conventional Energy Sources

1. Fossil fuel sources, such as coal, petroleum, natural gas and nuclear energy use exhaustible raw materials.
2. Sustainable energy resources are only the renewable energy sources like solar, wind, hydro-geothermal and biomass.

Solar Energy

1. Sun rays tapped in photovoltaic cells can be converted into energy, known as solar energy
2. The two effective processes considered to be very effective to tap solar energy are photovoltaic and solar thermal technology
3. Solar thermal technology has some relative advantages over all other non-renewable energy sources.
4. It is cost competitive, environment friendly and easy to construct
5. Solar energy is 7 per cent more effective than coal or oil based plants and 10 per cent more effective than nuclear plants.
6. The western part of India has greater potential for the development of solar energy in Gujarat and Rajasthan.

Wind Energy

1. Wind energy is absolutely pollution free, inexhaustible source of energy
2. Conversion from blowing wind is simple
3. The kinetic energy of wind, through turbines is converted into electrical energy.
4. The permanent wind systems such the trade winds, westerlies and seasonal wind like monsoon have been used as source of energy.
5. Besides these, local winds, land and sea breezes can also be used to produce electricity
6. Spread over 12 suitable locations, especially in coastal areas.
7. According to the estimation by Ministry of Power, India will be able to produce 3,000 megawatts of electric from this source.
8. The Ministry of non-conventional sources of energy is developing wind energy in India to lessen the burden of oil import bill
9. The country's potential of wind power generation exceeds 50,000 megawatts, of which one fourth can be easily harnessed.
10. In Rajasthan, Gujarat, Maharashtra and Karnataka, favourable conditions for wind energy exist.
11. Another, wind power plant is located at Tuticorin in Tamil Nadu

Tidal and Wave Energy

1. Ocean currents are the store-house of infinite energy
2. Large tidal waves are known to occur along the west coast of India
3. Hence, India has great potential for the development of tidal energy along the coasts but so far these have not yet been utilised

Geothermal Energy

1. When the magma from the interior of earth, comes out on the surface, tremendous heat is released.
2. This heat energy can successfully be tapped and converted to electrical energy.
3. Apart from this, the hot water that gushes out through the geyser wells is also used in the generation of thermal energy.
4. Apart from this, the hot water that gushes out through the geyser wells is also used in the generation of thermal energy.
5. The hot springs and geysers are being used since medieval period.
6. In India, a geothermal energy plant has been commissioned at Manikaran in Himachal Pradesh.
7. The first successful (1890) attempt to tap the underground heat was made in the city of Boise, Idaho (U.S.A.),

8. Where a hot water pipe network was built to give heat to the surrounding buildings. This plant is still working.

Bio-energy

1. Bio-energy refers to energy derived from biological products which includes agricultural residues, municipal, industrial and other wastes.
2. It can be converted into electrical energy, heat energy or gas for cooking
3. It will also process the waste and garbage and produce energy.
4. This will improve economic life of rural areas in developing countries, reduce environmental pollution
5. Enhance self-reliance and reduce pressure on fuel wood
6. One such project converting municipal waste into energy is Okhla in Delhi.

Conservation of Mineral Resources

1. The challenge of sustainable development requires integration of quest for economic development with environmental concerns.
2. Traditional methods of resource use result into generating enormous quantity of waste as well as create other environmental problems.
3. The alternative energy sources like solar power, wind, wave, geothermal energy are inexhaustible resource
4. These should be developed to replace the exhaustible resources
5. In case of metallic minerals, use of scrap metals will enable recycling of metals.
6. Use of scrap is especially significant in metals like copper, lead and zinc in which India's reserves are meagre
7. Use of substitutes for scarce metals may also reduce their consumption.
8. Export of strategic and scarce minerals must be reduced, so that the existing reserve may be used for a longer period.

MANUFACTURING INDUSTRIES

Types of Industries

- Industries are classified in a number of ways. On the basis of size, capital investment and labour force employed
- Industries are classified as large, medium, small scale, and cottage industries.

On the basis of ownership, industries are categorised as

- Public sector, (ii) private sector, and (iii) joint and cooperative sector,
- Industries of strategic and national importance are usually in the public sector.

On the basis of the use of their products

- Basic goods industries, (ii) capital goods industries (iii) intermediate goods industries, and (iv) consumer goods industries.

On the basis of raw materials used by them.

- Agriculture based industries, (ii) forest-based industries, (iii) mineral-based industries, and (iv) industrially processed raw material based industries

Based on the nature of the manufactured products. Eight classes of industries, thus identified are

- Metallurgical Industries, (2) Mechanical Engineering Industries, (3) Chemical and Allied Industries, (4) Textile Industries, (5) Food Processing Industries, (6) Electricity Generation, (7) Electronics and (8) Communication Industries.

Foot loose industries

- An industry that is not tied to any particular location or country, and can relocate across national borders in response to changing economic conditions. Many manufacturing industries seem to have this characteristic.

Industrial Policy

1. India, being a democratic country aims at bringing about economic growth with balanced regional development
2. Establishment of iron and steel industry in Bhilai and Rourkela were based on decision to develop backward tribal areas of the country.
3. At present, government of India provides lots of incentives to industries locating in backward areas.
4. Major Industries
5. The iron and steel industry is basic to the industrial development of any country
6. The cotton textile Industry is one of our traditional industries
7. The sugar Industry is based on local raw materials which prospered even in the British period
8. Petrochemical Industry
9. IT industry

The Iron and Steel Industry

1. In India, there is a crescent shaped region comprising parts of Chhattisgarh, Northern Orissa, Jharkhand and western West Bengal
2. Which is extremely rich in high grade iron ore, good quality coking coal and other supplementing raw materials.

Integrated Steel Plants

TISCO

1. The Tata Iron and Steel plant lies very close to the Mumbai-Kolkata railway line and about 240 km away from Kolkata
2. Which is the nearest port for the export of steel
3. The rivers Subarnarekha and Kharkai provide water to the plant.
4. The iron ore for the plant is obtained from Noamundi and Badam Pahar
5. Coal is brought from Joda mines in Orissa
6. Coking coal comes from Jharia and west Bokaro coalfields.

IISCO

1. The Indian Iron and Steel Company (IISCO) set up its first factory at Hirapur and later on another at Kulti.
2. In 1937, the Steel Corporation of Bengal was constituted in association with IISCO
3. Set up another iron and steel producing unit at Burnpur (West Bengal).

4. All the three plants under IISCO are located very close to Damodar valley coal fields (Raniganj, Jharia, and Ramgarh)
5. Iron ore comes from Singhbhum in Jharkhand.
6. Water is obtained from the Barakar River, a tributary of the Damodar
7. All the plants are located along the Kolkata-Asansol railway line
8. Unfortunately, steel production from IISCO fell considerably in 1972-73 and the plants were taken over by the government.

Visvesvaraiya Iron and Steel Works Ltd. (VISL)

1. The third integrated steel plant, the Visvesvaraiya Iron and Steel Works, initially called the Mysore Iron and Steel Works
2. Is located close to an iron ore producing area of Kemangundi in the Bababudan hills.
3. Limestone and manganese are also locally available
4. But this region has no coal
5. At the beginning, charcoal obtained by burning wood from nearby forests was used as fuel till 1951.
6. Afterwards, electric furnaces were installed which use hydroelectricity from the Jog Falls hydel power project
7. The Bhadravati River supplies water to the plant
8. This plant produces specialised steels and alloys.
9. After independence, during the Second Five Year Plan (1956-61), three new integrated steel plants were set up with foreign collaboration
10. Rourkela in Orissa
11. Bhilai in Chhattisgarh
12. Durgapur in West Bengal.
13. These were public sector plants under Hindustan Steel Limited (HSL)
14. In 1973, the Steel Authority of India Limited (SAIL) was created to manage these plants.

Rourkela Steel Plant

1. The Rourkela Steel plant was set up in 1959 in the Sundargarh district of Orissa in collaboration with Germany
2. The plant was located on the basis of proximity to raw materials,
3. Thus, minimising the cost of transporting weight losing raw material.
4. Has a unique locational advantage, as it receives coal from Jharia (Jharkhand) and iron ore from Sundargarh and Kendujhar.
5. The Hirakud project supplies power for the electric furnaces and water is obtained from the Koel and Sankh rivers.

Bhilai Steel Plant

1. The Bhilai Steel Plant was established with Russian collaboration in Durg District of Chhattisgarh
2. Started production in 1959
3. The iron ore comes from Dalli-Rajhara mine
4. Coal comes from Korba and Kargali coal fields.
5. The water comes from the Tanduladam and the power from the Korba Thermal Power Station.
6. This plant also lies on the Kolkata-Mumbai railway route.
7. The bulk of the steel produced goes to the Hindustan Shipyard at Vishakhapatnam.

Durgapur Steel Plant

1. Durgapur Steel Plant, in West Bengal, was set up in collaboration with the government of the United Kingdom
2. Started production in 1962.

3. This plant lies in Raniganj and Jharia coal belt and gets iron ore from Noamundi
4. Durgapur lies on the main Kolkata-Delhi railway route
5. Hydel power and water is obtained from the Damodar Valley Corporation (DVC)

Bokaro Steel Plant

1. This steel plant was set up in 1964 at Bokaro with Russian collaboration
2. This plant was set up on the principle of transportation cost minimisation by creating Bokaro-Rourkela combine
3. It receives iron ore from the Rourkela region and the wagons on return take coal to Rourkela.
4. Other raw materials come to Bokaro from within a radius of about 350 km
5. Water and Hydel power is supplied by the Damodar Valley Corporation.

Other Steel Plants

1. New steel plants which were set up in the Fourth Plan period are away from the main raw material sources.
2. All the three plants are located in South India.
3. The Vizag Steel Plant, in Vishakhapatnam in Andhra Pradesh is the
4. First port based plant which started operating in 1992. Its port location is of advantage.
5. The Vijayanagar Steel Plant at Hospet in Karnataka was developed using indigenous technology
6. This uses local iron ore and limestone.
7. The Salem Steel Plant in Tamil Nadu was commissioned in 1982.
8. Apart from these major steel plants, there are more than 206 units located in different parts of the country
9. Most of these use scrap iron as their main raw material, and process it in electric furnaces.

The Cotton Textile Industry

1. The cotton textile industry is one of the traditional industries of India
2. In the ancient and the medieval times, it used to be only a cottage industry
3. India was famous worldwide for the production of muslin, a very fine variety of cotton cloth, calicos, chintz and other different varieties of fine cotton cloth
4. The development of this industry in India was due to several factors
5. One, it is a tropical country and cotton is the most comfortable fabric for a hot and humid climate
6. Second, large quantity of cotton was grown in India
7. Abundant skilled labour required for this industry was available in this country.
8. In fact, in some areas the people were producing cotton textiles for generations and transferred the skill from one generation to the other and in the process perfected their skills.
9. Initially, the British did not encourage the development of the indigenous cotton textile industry.
10. They exported raw cotton to their mills in Manchester and Liverpool and brought back the finished products to be sold in India.
11. **In 1854, the first modern cotton mill was established in Mumbai.**
12. This city had several advantages as a cotton textile manufacturing centre.
13. It was very close to the cotton producing areas of Gujarat and Maharashtra
14. Raw cotton used to be brought to Mumbai port to be transported to England.
15. Therefore, cotton was available in Mumbai city itself. Moreover, Mumbai even then was the financial centre and the capital needed to start an industry was available there
16. As a large town, providing employment opportunities attracted labour in large numbers.
17. Hence, cheap and abundant labour too was available locally
18. Subsequently, two more mills, the Shahpur Mill and the Calico Mill were established in Ahmedabad

19. By 1947, the number of mills in India went up to 423 but the scenario changed after partition and this industry suffered a major recession.
20. This was due to the fact that the most of the good quality cotton growing areas had gone to West Pakistan
21. And India was left with 409 mills and only 29 per cent of the cotton producing area.
22. After Independence, this industry gradually recovered and eventually flourished
23. In 1998, India had 1782 mills; of which, 192 mills were in the public sector and 151 mills in the cooperative sector.
24. The largest number, that is, 1,439 mills were in the private sector
25. The cotton textile industry in India can be broadly divided into two sectors,
26. The organised sector and the decentralised sector
27. The decentralised sector includes cloth produced in handlooms (including Khadi) and power looms.
28. The production of the organised sector has drastically fallen from 81 per cent in the mid-twentieth century to only about 6 per cent in 2000.
29. At present, the power looms on the decentralised sector produce more than 59 per cent and the handloom sector produces about 19 per cent of all cotton cloth produced in the country
30. Cotton is a "pure" raw material which does not lose weight in the manufacturing process.
31. So other factors, like, power to drive the looms, labour, capital or market may determine the location of the industry
32. At present the trend is to locate the industry at or close to markets, as it is the market that decides what kind of cloth is to be produced
33. The Swadeshi movement gave a major impetus to the industry as there was a call for boycotting all British made goods in favour of Indian goods.
34. After 1921, with the development of the railway network other cotton textile centres expanded
35. In southern India, mills were set up at Coimbatore, Madurai and Bangalore.
36. In central India, Nagpur, Indore, Solapur and Vadodara became cotton textile centres
37. Cotton textile mills were set up at Kanpur based on local investment.
38. Mills were also set up at Kolkata due to its port facilities.
39. The development of hydro-electricity also favoured the location of the cotton textile mills away from the cotton producing areas.
40. The rapid development of this industry in Tamil Nadu is the result of the abundant availability of hydel power for the mills
41. Lower labour costs at centres like Ujjain, Bharuch, Agra, Hathras, Coimbatore and Tirunelveli also caused industries to be located away from cotton producing areas.
42. Thus, the cotton textile industry is located in almost every state in India,
43. Presently, the major centres of the cotton textile industry are Ahmedabad, Bhiwandi, Solapur, Kolhapur, Nagpur, Indore and Ujjain.
44. Maharashtra, Gujarat and Tamil Nadu are the leading cotton producing states
45. West Bengal, Uttar Pradesh, Karnataka, and Punjab are the other important cotton textile producers.
46. Tamil Nadu has the largest number of mills and most of them produce yarn rather than cloth
47. Coimbatore has emerged as the most important centre with nearly half the mills located there
48. Chennai, Madurai, Tirunelveli, Tuticorin, Thanjavur, Ramanathapuram and Salem are the other important centres.
49. In Karnataka, the cotton textile industry has developed in the cotton producing areas in the north-eastern part of the state.
50. Davangere, Hubli, Bellary, Mysore and Bangalore are important centres.
51. In new state Telangana, the cotton textile industry is located in the cotton producing Telangana region, where most of the mills are spinning mills producing yarn
52. The important centres are Hyderabad, Secunderabad, Warangal and Guntur
53. In Uttar Pradesh, Kanpur is the largest centre.
54. Some of the other important centres are Modinagar, Hathras, Saharanpur, Agra and Lucknow
55. In West Bengal, the cotton mills are located in the Hugli region.

56. Howrah, Serampore, Kolkata and Shyamnagar are the important centres.
57. Production of cotton cloth increased almost five times from 1950-51 to 1999-2000
58. Cotton textile has been facing tough competition from synthetic cloth.

Sugar Industry

1. The sugar industry is the second most important agro-based industry in the country
2. India is the largest producer of both sugarcane and cane sugar and contributes about 8 per cent of the total sugar production in the world.
3. Besides, khandasari and gur or jaggery are also prepared from sugarcane.
4. This industry provides employment for more than 4 lakh persons directly and a large number of farmers indirectly
5. Sugar industry is a seasonal industry because of the seasonality of raw materials.
6. Development of the industry on modern lines dates back to 1903, when a sugar mill was started in Bihar.
7. Subsequently, sugar mills were started in other parts of Bihar and Uttar Pradesh.
8. In 1950-51, 139 factories were in operation producing 11.34 lakh tonnes of sugar.
9. The number of sugar factories rose to 506 and production to 176, 99 lakh tonnes in 2000-01.

Location of the Sugar Industry

1. Sugarcane is a weight-losing crop. The ratio of sugar to sugarcane varies between 9 to 12 per cent depending on its variety
2. Its sucrose content begins to dry during haulage after it has been harvested from the field.
3. Better recovery of sugar is dependent upon its being crushed within 24 hours of its harvesting
4. Sugar factories hence, are located within the cane producing regions
5. Maharashtra has emerged as a leading sugar producer in the country and produces more than one-third of the total production of the sugar in the country.
6. There are 119 sugar Mills in the state in a narrow belt extending from Manmad in the north to Kolhapur in the south.
7. There are 87 mills in the cooperative sector.
8. Uttar Pradesh is the second largest producer of sugar.
9. The sugar factories are concentrated in two belts – the Ganga-Yamuna doab and the tarai region.
10. The major sugar producing centres in the Ganga -Yamuna doab are Saharanpur, Muzaffarnagar, Meerut, Ghaziabad, Baghpat and Bulandshahr districts
11. While Kheri, Lakhimpur, Basti, Gonda, Gorakhpur, Bahraich are important sugar producing districts in the Tarai region
12. In Tamil Nadu, sugar factories are located in Coimbatore, Vellore, Tiruvanamalai, Villupuram and Tiruchchirappalli districts.
13. Belgaum, Bellary, Mandya, Shimoga, Bijapur, and Chitradurg districts are the major producers in Karnataka.
14. The industry is distributed in the coastal regions i.e. East Godavari, West Godavari, Vishakhapatnam districts and Nizamabad, and Medak districts of Telangana
15. Along with Chittoor district of Rayalseema.
16. The other States which produce sugar are Bihar, Punjab, Haryana, Madhya Pradesh and Gujarat. Saran, Champaran, Muzaffarnagar, Siwan, Darbhanga, and Gaya are the important sugarcane producing districts in Bihar.
17. The relative significance of Punjab has declined, although Gurdaspur, Jalandhar, Sangarur, Patiala and Amritsar are major sugar producers.
18. In Haryana, sugar factories are located in Yamuna Nagar, Rohtak, and Hissar and Faridabad districts.
19. Sugar industry is comparatively new in Gujarat.
20. Sugar mills are located in the cane growing tracts of Surat, Junagarh, Rajkot, Amreli, Valsad and Bhavnagar districts.

Petrochemical Industries

1. This group of industries has been growing very fast in India
2. In 1960s, demand for organic chemicals increased so fast that it became difficult to meet this demand.
3. At that time, petroleum refining industry expanded rapidly.
4. Many items are derived from crude petroleum, which provide raw materials for many new industries

This group of industries is divided into four sub-groups:

- Polymers,
- Synthetic fibres
- Elastomers,
- Surfactant intermediate.

Mumbai is the hub of the petrochemical industries.

Three organisations are working in the petrochemical sector

1. Under the administrative control of the Department of Chemicals and Petrochemicals
2. First is the Indian Petrochemical Corporation Limited (IPCL), a public sector undertaking
3. It is responsible for the manufacture and distribution of the various petrochemicals like polymers, chemicals, fibres and fibre intermediates
4. Second is the Petrofils Cooperative Limited (PCL), a joint venture of the Government of India and Weaver's Cooperative Societies
5. It produces polyester filament yarn and nylon chips at its two plants located at Vadodara and Naldhari in Gujarat
6. Third is the Central Institute of Plastic Engineering and Technology (CIPET), involved in imparting training in petro-chemical industry

Polymers

1. Polymers are made from ethylene and propylene
2. These materials are obtained in the process of refining crude oil
3. Among polymers, polyethylene is a widely used thermoplastic.
4. Plastic is first converted into sheets, powder, resin and pellets, and then used in manufacturing plastic products
5. Plastic products are preferred because of their strength, flexibility, water and chemical resistance and low prices
6. Production of plastic polymers started in India in the late fifties and the early sixties using other organic chemicals.

The National Organic Chemicals Industries Limited (NOCIL)

1. Established in private sector in 1961, started the first naphtha based chemical industry in Mumbai
2. The plants located at Mumbai, Barauni, Mettur, Pimpri and Rishra are the major producers of plastic materials
3. About 75 per cent of these units are in small scale sector.
4. The industry also uses recycled plastics, which constitutes about 30 per cent of the total production.
5. Synthetic fibres are widely used in the manufacturing of fabrics because of their inherent strength, durability, wash ability, and resistance to shrinkage.
6. Industries manufacturing nylon and polyester yarns are located at Kota, Pimpri, Mumbai, Modinagar, Pune, Ujjain, Nagpur and Udhna.

7. Due to its non-biodegradable quality it has emerged as the greatest threat to our environment
8. Hence, use of plastic is being discouraged in different states of India

Industrial Regions in India

- Industries are not evenly distributed in the country.

- **Major Industrial Regions (8)**

- Mumbai-Pune Region,
- Hugli Region,
- Bangalore- Tamil Nadu Region,
- Gujarat Region
- Chotanagpur Region,
- Vishakhapatnam-Guntur Region,
- Gurgaon-Delhi-Meerut Region,
- Kollam-Tiruvantapuram Region

- **Minor Industrial Regions (13)**

- Ambala-Amritsar
- Saharanpur -Muzaffarnagar -Bijnor
- Indore-Dewas-Ujjain
- Jaipur-Ajmer,
- Kolhapur -South Kannada,
- Northern Malabar
- Middle Malabar
- Adilabad-Nizamabad,
- Allahabad- Varanasi-Mirzapur
- Bhojpur -Munger
- Durg-Raipur
- Bilaspur-Korba
- Brahmaputra valley

- **Industrial Districts (15)**

- Kanpur
- Hyderabad
- Agra
- Nagpur
- Gwalior
- Bhopal
- Lucknow
- Jalpaigur
- Cuttack
- Gorakhpur
- Aligarh,
- Kota
- Purnia
- Jabalpur
- Bareilly

Several indices are used to identify the clustering of industries, important among them are

- The number of industrial units
- Number of industrial workers
- Quantum of power used for industrial purposes
- Total industrial output
- Value added by manufacturing

Mumbai-Pune Industrial Region

1. It extends from Mumbai-Thane to Pune and in adjoining districts of Nasik and Solapur
2. Development of this region started with the location of cotton textile industry in Mumbai
3. Opening of the Suez Canal in 1869 provided impetus to the growth of Mumbai port
4. Machineries were imported through this port
5. Hydro-electricity was developed in the Western Ghat region to meet the requirements of this industry
6. With the development of cotton textile industry, chemical industry also developed
7. Opening of the Mumbai High petroleum field and erection of nuclear energy plants added additional pull to this region

Hugli Industrial Region

1. Located along the Hugli River, this region extends from Bansberia in the north to Birlanagar in the south for a distance of about 100 km.
2. It developed with the opening of river port on Hugli
3. Later, Kolkata was connected with interior parts by railway lines and road routes.
4. Development of tea plantations in Assam and northern hills of West Bengal
5. The processing of indigo earlier and jute later coupled with the
6. Opening of coalfields of the Damodar Valley and iron ore deposits
7. Of the Chotanagpur plateau, contributed to the industrial development of the region.
8. Cheap labour available from thickly populated part of Bihar, eastern Uttar Pradesh and Orissa also contributed to its development
9. Kolkata, being the capital city of British India (1773-1911),
10. Attracted the British capital. The establishment of first jute mill at Rishra in 1855 ushered in the era of modern industrial clustering in this region.
11. The major concentration of jute industry is at Haora and Bhatapara.
12. The partition of the country in 1947 adversely affected this industrial region.
13. Cotton textile industry also grew along with jute industry, paper, engineering, textile machinery, electrical, chemical, pharmaceuticals, fertiliser and petrochemical industries have also developed within this region.
14. Factory of the Hindustan Motors Limited at Konnagar and diesel engine factory at Chittaranjan are landmarks of this region.
15. Location of petroleum refinery at Haldia has facilitated the development of a variety of industries
16. Important industrial centres of this region are Kolkata, Haora, Haldia, Serampore, Rishra, Shibpur, Naihati, Kakinara, Shamnagar, Titagarh, Sodepur, Budge Budge, Birlanagar, Bansberia, Belgurriah, Triveni, Hugli, Belur, etc.
17. However, industrial growth of this region has slowed down in comparison to other regions.
18. Decline of the jute industry is one of the reasons

Bangalore-Chennai Industrial Region

1. This region witnessed most rapid industrial growth in post-Independence period.
2. Till 1960, industries were confined to Bangalore, Salem and Madurai districts but now they have spread over all the districts of Tamil Nadu except Viluppuram
3. Cotton textile industry was the first to take roots due to the presence of cotton growing areas.
4. Along with cotton mills, loom industry spread very rapidly. Several heavy engineering industries converged at Bangalore.
5. Aircraft (HAL), machine tools, telephone (HTL) and Bharat Electronics are industrial landmarks of this region

Gujarat Industrial Region

1. The nucleus of this region lies between Ahmedabad and Vadodara

2. But this region extends upto Valsad and Surat in the south and to Jamnagar in the west.
3. Development of this region is also associated with the location of the cotton textile industry since 1860s.
4. This region became an important textile region with the decline of the cotton textile industry at Mumbai.
5. Located in cotton growing area, this region has double advantage of the proximity of raw materials as well as of market.
6. The discovery of oil fields led to the establishment of petrochemical industries around Ankleshwar, Vadodara and Jamnagar.
7. The port at Kandla helped in the rapid growth of this region. Petroleum refinery at Koyali provided raw materials to a host of petrochemical industries.
8. Recently, largest petroleum refinery has been set up at Jamnagar.

Chotanagpur Region

1. This region extends over Jharkhand, northern Orissa and western West Bengal and is known for the heavy metallurgical industries.
2. This region owes its development to the discovery of coal in the Damodar Valley and metallic and non-metallic minerals in Jharkhand and northern Orissa.
3. Proximity of coal, iron ore and other minerals facilitated the location of heavy industries in this region
4. Six large integrated iron and steel plants at Jamshedpur, BurnpurKulti, Durgapur, Bokaro and Rourkela are located within this region
5. Densely populated surrounding regions provide cheap labour and Hugli region provides vast market for its industries.

Vishakhapatnam-Guntur Region

1. This industrial region extends from Vishakhapatnam district to Kurnool and Prakasam districts in the south.
2. Industrial development of this region hinges upon Vishakhapatnam and Machilipatnam ports and developed agriculture and rich reserves of minerals in their hinterlands.
3. Coalfields of the Godavari basin provide energy
4. Ship building industry was started at Vishakhapatnam in 1941
5. Petroleum refinery based on imported petroleum facilitated the growth of several petrochemical industries
6. One lead-zinc smelter is functioning in Guntur district
7. Iron and steel plant at Vishakhapatnam uses the Bailadila iron ore

Gurgaon-Delhi-Meerut Region

1. Industries located in this region have shown very fast growth in the recent past
2. This region is located far away from the mineral and power resources
3. Therefore, the industries are light and market-oriented
4. Electronics, light engineering and electrical goods are major industries of this region.
5. Software industry is a recent addition.
6. To the south lies the Agra-Mathura industrial area which specialises in glass and leather goods
7. Mathura with an oil refinery is a petrochemical complex
8. Among industrial centres, mention be made of Gurgaon, Delhi, Shahdara, Faridabad, Meerut, Modinagar, Ghaziabad, Ambala, Agra and Mathura

Kollam-Tiruvananthapuram Region

1. This industrial region is spread over Tiruvananthapuram, Kollam, Alwaye, Ernakulam and Alappuzha districts

2. Plantation agriculture and hydropower provide industrial base to this region
3. Located far away from the mineral belt of the country
4. Agricultural products processing and market oriented light industries predominate the region
5. Among them, cotton textile, sugar, rubber, matchbox, glass, chemical fertiliser and fish-based industries are important.
6. Location of petroleum refinery at Kochchi has added a vista of new industries to this region

TRANSPORT AND COMMUNICATION

Road Transport

1. India has one of the largest road networks in the world with a total length of 33.1 lakh km
2. It is second largest in the world about 85 per cent of passenger and 70
3. Per cent of freight traffic are carried by roads every year.

Road

1. Road transport is relatively suitable for shorter distance travel.
2. Sher Shah Suri built the Shahi (Royal) road to strengthen and consolidate his empire from the Indus Valley to the Sonar Valley in Bengal.
3. This road was renamed the Grand Trunk (GT) road during the British period, connecting Calcutta and Peshawar.
4. At present, it extends from Amritsar to Kolkata.
5. It is bifurcated into 2 segments: (a) National Highway (NH)-1 from Delhi to Amritsar
(c) NH- 2 from Delhi to Kolkata.
6. The first serious attempt was made in 1943 when 'Nagpur Plan' was drawn.
7. This plan could not be implemented due to lack of coordination among the princely states and British India.
8. After Independence, twenty-year road plan (1961) was introduced to improve the conditions of roads in India.

National Highways

1. The main roads which are constructed and maintained by the Central Government are known as the National Highways.
2. These roads are meant for inter-state transport and movement of defence men and material in strategic areas.
3. The length of the National Highways has increased from 19,700 km in 1951 to 65,769 km in 2005
4. The National Highways constitute only two per cent of the total road length but carry 40 per cent of the road traffic.
5. The National Highways Authority of India (NHAI) was operationalised in 1995.
6. It is an autonomous body under the Ministry of Surface Transport.
7. National Highways Development Projects

8. NHAI has taken up some major projects in the country under different phases

Golden Quadrilateral

- It comprises construction of 5,846 km long 4/6 lane, high density traffic corridor,
- To connect India's four big metro cities of Delhi-Mumbai-Chennai Kolkata.
- With the construction of Golden Quadrilateral, the time-distance and cost of movement among the mega cities of India will be considerably minimised.

North-South and East-West Corridors

- North-South corridor aims at connecting Srinagar in Jammu and Kashmir with Kanyakumari in Tamilnadu (including Kochchi-Salem Spur) with 4,076kmlong road.

Other Roads

1. Other roads include Border Roads and International Highways.
2. The Border Road Organisation (BRO) was established in May 1960
3. For accelerating economic development and strengthening defence preparedness
4. Through rapid and coordinated improvement of strategically important roads
5. Along the northern and north-eastern boundary of the Country
6. It is a premier multifaceted construction agency.
7. It has constructed roads in high altitude mountainous terrain joining Chandigarh with Manali (Himachal Pradesh) and Leh (Ladakh).
8. This road runs at an average altitude of 4,270 metres above the mean sea level.

Rail Transport

1. Indian railways network is one of the longest in the world.
2. Mahatma Gandhi said, the Indian railways "brought people of diverse cultures together to contribute to India's freedom struggle."
3. Indian Railway was introduced in 1853, when a line was constructed from Bombay to Thane covering a distance of 34 km.
4. Indian Railways is the largest government undertaking in the country.
5. In India, the railway system has been divided into sixteen zones.

Railway Zone	Headquarters
Central	Mumbai CST
Eastern	Kolkata
East Central	Hajipur
East Coast	Bhubaneswar
Northern	New Delhi
North Central	Allahabad

North Eastern	Gorakhpur
North East Frontier	Maligaon (Guwahati)
North Western	Jaipur
Southern	Chennai
South Central	Secunderabad
South Eastern	Kolkata
South East Central	Bilaspur
South Western	Hubli
Western	Mumbai (Church Gate)
West	Central Jabalpur

Konkan Railway

1. One of the important achievements of Indian Railways has been the construction of Konkan Railway in 1998.
2. It is 760 km long rail route connecting Roha in Maharashtra to Mangalore in Karnataka.
3. Asia's largest tunnel which is nearly 6.5km long, also lies on this route.
4. The states of Maharashtra, Goa and Karnataka are partners in this undertaking.

The famous Nehru Trophy Boat Race (VALLANKALI) is also held in the backwaters.

Oceanic Routes

1. India has a vast coastline of approximate 7,517 km, including islands
2. Twelve major and 185 minor ports provide infrastructural support to these routes.
3. Approximately 95 per cent of India's foreign trade by volume and 70 per cent by value moves through ocean routes.
4. Air Transportation
5. Air transport in India made a beginning in 1911 when airmail operation commenced over a little distance of 10 km between Allahabad and Naini.
6. But its real development took place in post-Independent period
7. The Airport Authority of India is responsible for providing safe, efficient air traffic and aeronautical communication services in the Indian Air Space
8. The authority manages 126 airports including 11 international, 86 domestic and 29 civil enclaves at defence air fields.

Air India

1. Air India provides International Air Services for both passengers and cargo traffic
2. In 2005, it carried 12.2 million passengers and 4.8 lakh metric tonnes of cargo.
3. About 52 per cent of the total air traffic was handled only at Mumbai and Delhi airports.
4. Pawan Hans is the helicopter service operating in hilly areas and is widely used by tourists in north-eastern sector.

Oil and Gas Pipelines

1. Pipelines are the most convenient and efficient mode of transporting liquids and gases over long distances
2. Even solids can also be transported by pipelines after converting them into slurry.
3. It was incorporated in 1959 as a company. Asia's first cross country pipeline covering a distance of 1,157 km
4. Constructed by OIL from Naharkatiya oilfield in Assam to Barauni refinery in Bihar.
5. It was further extended up to Kanpur in 1966
6. Another extensive network of pipelines has been constructed in the western region of India of which Ankleshwar-Koyali
7. Mumbai High Koyali and Hazira-Vijaipur-Jagdishpur (HVJ) are most important
8. Recently, a 1256 km long pipeline connecting Salaya (Gujarat) with Mathura (U.P.) has been constructed
9. It supplies crude oil from Gujarat to Punjab (Jalandhar) via Mathura.
10. OIL is in the process of constructing of 660 km long pipeline from Numaligarh to Siliguri.

Mass Communication System

1. Radio broadcasting started in India in 1923 by the Radio Club of Bombay.
2. Since then, it gained immense popularity and changed the sociocultural life of people.
3. Government took this opportunity and brought this popular mode of communication under its control in 1930
4. Under the Indian Broadcasting System.
5. It was changed to All India Radio in 1936 and to Akashwani in 1957
6. All India Radio broadcasts a variety of programmes related to information, education and entertainment
7. Special news bulletins are also broadcast at specific occasions like session of parliament and state legislatures.

Television (T.V.)

1. Television broadcasting has emerged as the most effective audio-visual medium
2. For disseminating information and educating masses.
3. Initially, the T.V. services were limited
4. Only to the National Capital where it began in 1959.
5. After 1972, several other centres became operational
6. In 1976, TV was delinked from All India Radio (AIR)
7. Got a separate identity as Doordarshan (DD).
8. After INSAT-1A (National Television-DD1) became operational,
9. Common National Programmes (CNP)

Satellite Communication

1. Satellites are mode of communication in themselves as well as they regulate the use of other means of communication.
2. However, use of satellite in getting a continuous and synoptic view of larger area
3. Has made satellite communication very vital for the country due to the economic and strategic reasons.
4. Satellite images can be used for the weather forecast, monitoring of natural calamities, surveillance of border areas, etc.
5. Satellite system in India can be grouped into two
6. Indian National Satellite System (INSAT)

7. Indian Remote Sensing Satellite System (IRS)
8. The INSAT, which was established in 1983,
9. Is a multipurpose satellite system for telecommunication
10. Meteorological observation and for various other data and programmes
11. The IRS satellite system became operational
12. With the launching of IRS-IA in March 1988 from Vaikanour in Russia.
13. India has also developed her own Launching Vehicle PSLV (Polar Satellite Launch Vehicle).
14. These satellites collect data in several spectral bands and transmit them to the ground stations for various uses.
15. The National Remote Sensing Agency (NRSA) at Hyderabad provides facilities for acquisition of data and its processing.

INTERNATIONAL TRADE

1. The capacity of Indian ports increased from 20 million tonnes of cargo handling in 1951 to more than 500 million tonnes at present.
2. Some of the Indian ports along with their hinterlands are as follows

Kandla Port

1. Situated at the head of Gulf of Kutch has been developed as a major port
2. To cater to the needs of western and north western parts of the country
3. Also to reduce the pressure at Mumbai port.
4. The port is specially designed to receive large quantities of petroleum and petroleum products and fertiliser.
5. The offshore terminal at Vadinar has been developed to reduce the pressure at Kandla port.
6. Demarcation of the boundary of the hinterland would be difficult as it is not fixed over space.
7. In most of the cases, hinterland of one port may overlap with that of the other.

Mumbai

1. Mumbai is a natural harbour and the biggest port of the country.
2. The port is situated closer to the general routes from the countries of Middle East,
3. Mediterranean countries, North Africa, North America and Europe where the major share of country's overseas trade is carried out.
4. The port is 20 km long and 6-10 km wide with 54 berths and has the country's largest oil terminal.
5. M.P., Maharashtra, Gujarat, U.P. and parts of Rajasthan constitute the main hinterlands of Mumbai ports.
6. Jawaharlal Nehru Port
7. Jawaharlal Nehru Port at Nhava Sheva was developed as a satellite port to relieve the pressure
8. At the Mumbai port.
9. It is the largest container port in India.

Marmagao Port

1. Marmagao Port, situated at the entrance of the Zuari estuary
2. Is a natural harbour in Goa.
3. It gained significance after its remodelling in 1961 to handle iron-ore exports to Japan.
4. Construction of Konkan railway has considerably extended the hinterland of this
5. Karnataka, Goa, Southern Maharashtra constitute its hinterland.
6. New Mangalore Port

7. New Mangalore Port is located in the state of Karnataka and caters to the needs of the export of iron-ore and iron-concentrates.
8. It also handles fertilisers, petroleum products, edible oils, coffee, tea, wood pulp, yarn, granite stone, molasses, etc.
9. Karnataka is the major hinterland for this port.

Kochchi Port

1. Kochchi Port, situated at the head of Vembanad Kayal, popularly known as the “Queen of the Arabian Sea,” is also a natural harbour.
2. This port has an advantageous location being close to the Suez-Colombo route.
3. It caters to the needs of Kerala, southern Karnataka and south western Tamil Nadu.

Kolkata Port

1. Kolkata Port is located on the Hugli River, 128 km inland from the Bay of Bengal.
2. Like the Mumbai port, this port was also developed by the British.
3. Kolkata had the initial advantage of being the capital of British India.
4. The port has lost its significance considerably on account of the diversion of exports to the other ports such as Vishakhapatnam
5. Paradwip and its satellite port, Haldia.
6. Kolkata port is also confronted with the problem of silt accumulation in the Hugli River
7. Which provides a link to the sea
8. Its hinterland covers U.P., Bihar, Jharkhand, West Bengal, Sikkim and the north-eastern states
9. Apart from this, it also extends ports facilities to our neighbouring land-locked countries such as Nepal and Bhutan.

Haldia Port

1. Haldia Port is located 105 km downstream from Kolkata.
2. It has been constructed to reduce the congestion at Kolkata port.
3. It handles bulk cargo like iron ore, coal, petroleum, petroleum products and fertilisers, jute, jute products, cotton and cotton yarn, etc.
4. Paradwip Port
5. Paradwip Port is situated in the Mahanadi delta,
6. About 100 km from Cuttack. It has the deepest harbour especially suited to handle very large vessels.
7. It has been developed mainly to handle large-scale export of iron-ore.
8. Orissa, Chhattisgarh and Jharkhand are the parts of its hinterland.
9. Vishakhapatnam Port
10. Vishakhapatnam Port in Andhra Pradesh is a land-locked harbour,
11. Connected to the sea by a channel cut through solid rock and sand

Chennai Port

1. Chennai Port is one of the oldest ports on the eastern coast.
2. It is an artificial harbour built in 1859.
3. It is not much suitable for large ships because of the shallow waters near the coast. Tamil Nadu and Pondicherry are its hinterland

Ennore

1. Ennore, a newly developed port in Tamil Nadu, has been constructed 25 km north of Chennai to relieve the pressure at Chennai port.

Tuticorin Port

1. Tuticorin Port was also developed to relieve the pressure of Chennai port.
2. It deals with a variety of cargo including coal, salt, food grains, edible oils, sugar, chemicals and petroleum products.

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