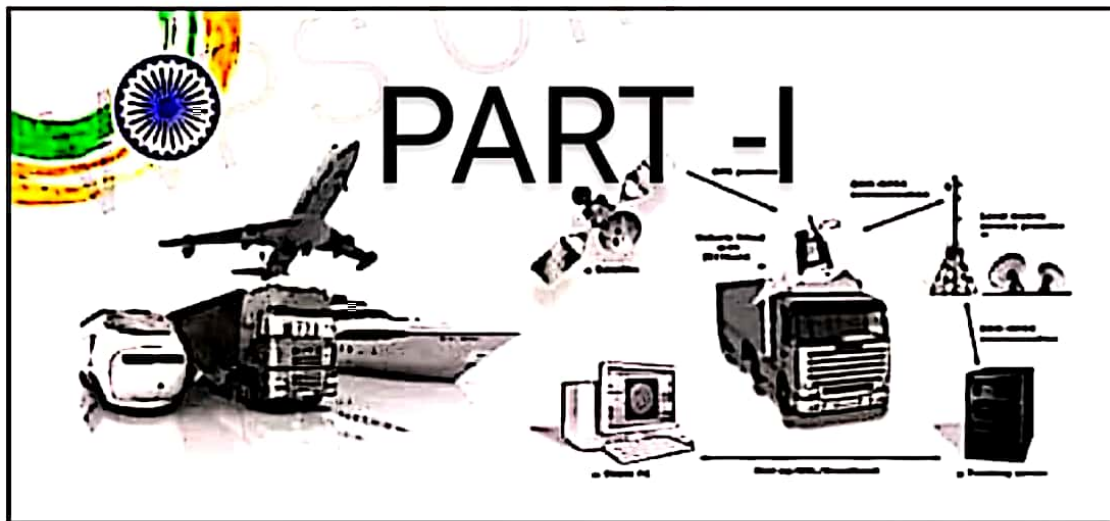


# Chapter 17

# TRANSPORT AND COMMUNICATION

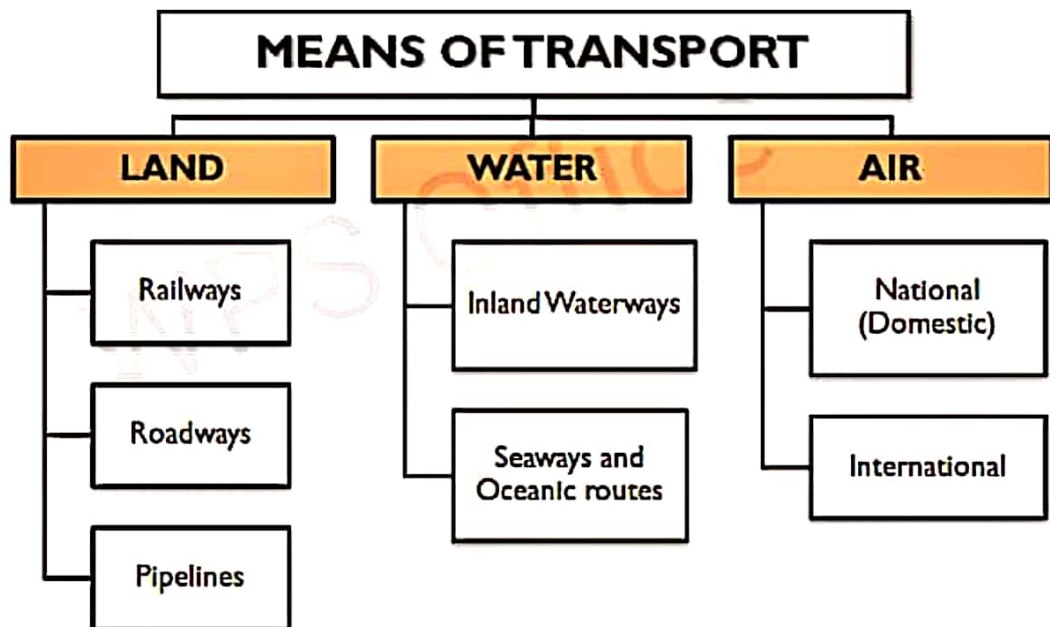


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# PART I: TRANSPORT

Transport is a system in which passengers and goods move from one place to another.



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# RAIL TRANSPORT



## Importance of Railways:

The Indian railway system is the main artery of the country's inland transport – forms the lifeline of the country.

- ❑ Helps in large-scale movement of freight (goods) and passenger traffic
- ❑ Contributes to economic growth.
- ❑ Promotes national integration.

## ❑ Growth of Indian Railways:

- ❑ *First Railway in India* between Mumbai and Thane (1853)
- ❑ Presently, Indian Railway network is the second largest in Asia and fourth largest in the world.
- ❑ Less efficient, expensive and polluting steam engines have been replaced by less polluting and less expensive diesel and electrical engines.

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- ❑ **COACH:** A carriage with roof and seats used by railways to carry *passengers* from one place to another.
- ❑ **WAGON:** A vehicle, open or closed, used by railways to transport *heavy goods* from one place to another.
  
- ❑ **FARE:** Amount charged by railways to carry *passengers*.
- ❑ **FREIGHT:** Amount charged by railways to transport *goods and luggage* from one place to another.
  
- ❑ **RAILWAY ZONES:** For better management, the Indian Railways have been divided into 16 zones.



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## FACTORS AFFECTING RAILWAYS

### i. Geographical Factors (Distribution of Railways in India)

□ Northern Plains has *dense network of railways* due to:

- (a) Flat, level land
- (b) Dense population
- (c) Large scale urbanisation
- (d) Agricultural and industrial development



*Important centres:* Delhi, Agra, Kanpur, Mughal Sarai, Lucknow, Patna, Kolkata (Howrah)

*Practically no Railways in the flood plains of many rivers in Bihar and Assam –* Presence of large number of rivers makes it necessary to construct bridges which involves heavy expenditure.

*The sandy areas of Rajasthan are also not much favourable for railways.*

There was no railway line between Jodhpur and Jaisalmer till 1966 – Due to:  
(a) difficulty in laying railway tracks on loose sand and (b) sparse population.

Similarly, *deltaic swamps of West Bengal, marshy areas of Rann of Kachchh* are also unfavourable for the development of railways.

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□ **The Peninsular Plateau** region of south India is *not as much suitable for railways*. Except Saurashtra and Tamil Nadu, a relatively open and more loose network has developed here.

(a) Hilly and plateau terrain which hinders the development of railways.

(b) Moderate population density

*Some important trunk routes:* Mumbai- Chennai, Mumbai-Kolkata, Mumbai-Thiruvananthapuram, Chennai-Kochi, Chennai-Hyderabad and Chennai-Delhi.

The Sahyadris (Western Ghats) can only be crossed through *gaps* like Thalghat, Bhorghat and Palghat to reach coastal trail heads like Mumbai, Vasco-de-Gama, Mangalore and Kochi.

The forested areas of Madhya Pradesh and Orissa also lack railways.

□ **The Eastern Coastal Plains and Western Coastal Plains** show a *distinct contrast in their railway networks*.

*The Eastern Coastal Plain* is quite wide and permits the construction of railways. There is a long trunk route along the east coast from Kolkata to Chennai.

On the *Western Coastal Plain*, the outcrops of the Western Ghats are very close to the coast and make the construction of railway lines a difficult task. However, the **Konkan Railway Line** from Roha (Maharashtra) to Mangalore (Karnataka) has been successfully constructed. It passes through several tunnels and over numerous bridges. This line has the longest tunnel in the Asia, 6.5 km long.

- The Himalayan region in the north is *almost entirely devoid of railways* due to its:
- (a) rugged hill and valley topography
  - (b) backward economy
  - (c) sparse population

Some *railway terminals* such as Jammu Tawi, Kotdwar, Dehra Dun, Kathgodam, etc. are found on the foothills.

Some *narrow gauge railway tracks* are found in the Himalayan region (Kalka-Shimla, Pathankot-Kangra and Siliguri-Darjeeling).

There is *practically no railway line* in the *northeastern states* of Meghalaya, Tripura, Arunachal Pradesh, Mizoram, Manipur and Nagaland – These areas have: (a) Rough terrain, (b) Thick forests, (c) Sparse population and (d) Backward economy which makes construction of railways difficult and costly.

A railway link between Jammu and Kashmir valley (Udhampur-Srinagar-Baramulla) is being planned at a very high cost.



Darjeeling Himalayan Railway



Kalka-Shimla Railway

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## ii. Economic Factors

- Railways develop more in the *economically advanced areas* where the need for railway network is felt more.
- We find the highest density of railways near *big urban and industrial centres* and in areas which are *rich in mineral and agricultural resources*.
- Conversely, railways bring economic prosperity to the areas through which they pass.

## iii. Political and Administrative Factors:

- The present railway system in India is the *legacy of the British rule*. The British administration planned the direction and pattern of the railway lines in such a way that they could exploit the valuable raw materials of India for the benefit of their industries and flood the Indian markets with the finished goods from Britain.
- Thus, top priority was given to the *big ports of Mumbai, Kolkata and Chennai*. These ports were connected with their hinterlands by railway lines to facilitate imports and exports.
- Presence of enclaves ruled by other foreign powers like France and Portugal, as well as autonomous princely states also hindered uniform distribution of rail tracks.



## BULLET TRAINS

- Foundation stone for *India's first Bullet train* (Ahmadabad-Mumbai) laid at Sabamati near Ahmadabad (Gujarat) in 2017. The project is scheduled to be completed by 2022. It will provide a big boost to employment generation and urban-industrial development along its route.
- Other Bullet Train routes planned:
  - Delhi Mumbai
  - Mumbai-Chennai
  - Mumbai-Nagpur
  - Delhi-Kolkata
  - Delhi-Chandigarh
  - Delhi-Nagpur

### DIAMOND QUADRILATERAL

Plan drawn to provide high-speed train services between important cities (Similar to the Golden Quadrilateral of Roadways).



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## PROBLEMS OF INDIAN RAILWAYS

- i. Indian railways operates in three different gauges\*. Shift from one gauge to another involves unloading and trans-shipment which is time consuming and expensive. Perishable commodities cannot withstand such delay.
- ii. Tracks are not suitable to handle the ever-increasing heavy load of passenger and goods traffic.
- iii. Repair and maintenance of old outdated bridges constructed long ago is important to avoid accidents.
- iv. Lack of space and congestion in cities leaves no room for expansion of railway networks.

### \*Broad gauge

Distance between two rails 1.676m;

### Metre gauge

Distance between two rails 1m;

### Narrow gauge

Distance between two rails 0.76m or 0.61m.

## METRO RAILWAYS

Introduced in some cities for rapid transit, like the Kolkata Metro (oldest) and Delhi Metro (largest network). Presently there are 13 operational metro railways in India.



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# ROAD TRANSPORT



## Importance of Roads:

- i. Important for the transportation of goods and passengers for *short and medium distances*.
- ii. Comparatively *easy and cheap to construct and maintain* roads.
- iii. Provides *door to door service* - easy contact between farms, fields, factories and markets.
- iv. Act as great *feeders to railways* - Without good and sufficient roads, railways cannot collect sufficient produce to make their operation possible.
- v. *\*More flexible than the railway transport* - Buses and trucks may be stopped anywhere and at any time on the road for loading and unloading passengers and goods whereas trains stop only at particular stations.
- vi. *\*Can negotiate high gradients and sharp turns* which railways cannot do - can be constructed in hilly areas also.
- vii. *\*Perishable commodities* like vegetables, fruits and milk are *transported more easily and quickly* by roads than by railways.

### *\* Advantages of Road Transport over Railways*

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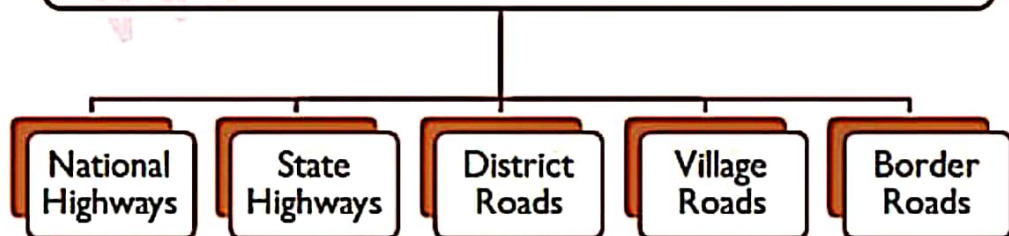
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## Disadvantages of Roads

- i. Not much suited for long distance travel.
- ii. Not suitable for heavy commodities like coal and iron.
- iii. More costly than rail transport.
- iv. Air pollution due to rapid increase in vehicles.
- v. Frequent road accidents due to increase in road traffic.

## CLASSIFICATION OF INDIAN ROADS

(On the basis of Importance, Maintenance and Administration)



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## National Highways

Main roads connecting state capitals, big cities and important ports, constructed and maintained by the Central Public Works Department (CPWD).

□ Some important National Highways:

NH 1	Delhi to Amritsar
NH 2	Delhi to Kolkata
NH 3	Agra to Mumbai
NH 4	Chennai to Thane
NH 6	Kolkata and Dhule; (Second longest)
NH 7	Varanasi to Kanniyakumari; (Longest)
NH 8	Delhi to Mumbai
NH 15	Rajasthan Desert

### Grand Trunk Road (G.T. Road)

- Constructed by Sher Shah Suri, connecting Peshawar to Kolkata.
- Connects *Amritsar to Kolkata* after partition of India in 1947.
- Named *Sher Shah Suri Marg* (NH1 and NH2)

□ In terms of width, National Highways may be classified into Single Lane, Double Lane, Four Lane, Six Lane, Eight Lane.

## Golden Quadrilateral Super Highways

National Highways Development Project (NHDP) being implemented by National Highways Authority of India (NHA).

NHDP has following two main components:

- Phase I – Golden Quadrilateral: National Highways connecting Delhi – Mumbai–Chennai–Kolkata–Delhi by six-lane super highways.
- Phase II–North-South Corridor and East-West Corridor.

Length of Various Sections

Name of side of the Golden Quadrilateral	Length (km)
Delhi-Mumbai	1419 km (shortest)
Mumbai-Chennai	1290 km
Chennai-Kolkata	1684 km (longest)
Kolkata-Delhi	1453 km
Total	5846 km

Name of Corridor	Length
North-South Corridor (Srinagar to Kanniyakumari)	4100 km
East-West Corridor (Silchar to Porbandar)	3300 km



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## State Highways

Constructed and maintained by state governments and join the state capitals with district headquarters and other important towns. These roads are also connected to the national highways.

## District Roadways

Join the district headquarters with the other places of the district; Developed and maintained by the Zila Parishads.

## Village Roads

Mainly the responsibility of village panchayats and connect the villages with the neighbouring towns and cities; Generally dusty tracks usable only during the fair weather and become muddy and unserviceable during the rainy season.

## Border Roads

Border Roads Organisation (BRO) set up for accelerating economic development and strengthening defence preparedness through rapid and co-ordinated improvement of roads in the north and north-eastern border areas. This organisation has constructed world's highest road joining Chandigarh with Manali in Himachal Pradesh and Leh in Ladakh.



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## DISTRIBUTION OF ROADS IN INDIA

- The Northern Plains has the maximum concentration of roads – due to  
(a) Flat fertile land and (b) High population density

Most of the roads are *unmetalled* as the Northern Plain is made up of sand, silt and clay and there is shortage of stone for constructing surfaced roads – building material has to be brought from Himalayas or Peninsular plateau.

*Uttar Pradesh* has the longest stretch of roads in north India.

- The Peninsular Plateau has *higher proportion of metalled roads* as it is composed of hard rocks and stone for constructing roads is readily available. Maharashtra and Kerala have highest concentration of roads in south India.
- The Himalayan Region is not suitable for building roads although building material abundantly available – due to rugged topography
- The North-Eastern States do not have a good network of roads due to:  
(a) Difficult terrain (b) Backward economy (c) Thick forest  
(d) Large number of swift streams and rivers due to heavy rainfall – large number of bridges need to be constructed.

## ROAD DENSITY

- Defined as the *length of roads per 100 sq km of surface area*.
- *Low Density of roads*: Himalayan region (Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Sikkim), Western Rajasthan, North-eastern States (Meghalaya, Manipur) - mostly roads constructed by BRO.
- *Lowest Density of Roads*: Jammu and Kashmir – 10 km per 100 sq km.
- *Highest Density of Roads*: Kerala – 526.9 km per sq km.
- *Moderate to high road density*: West Bengal, Goa, Andhra Pradesh, Tamil Nadu, Uttar Pradesh – due to high level of urbanisation and industrialisation.
- *Union territories except Andaman and Nicobar* are highly urbanised and have high road densities

### **Bharatmala Programme (2015)**

Taken up to develop road connectivity to border areas, backward areas, religious and tourist places, construction of coastal national corridors, economic corridor/ feeder routes, ring roads, removal of congestion points etc.

### **Setu Bharatam Programme (2016)**

Aims at making National highways free of railway level crossings to avoid accidents. It includes building of railway over-bridges (ROBs), railway under bridges (RUBs) and widening/ strengthening of old worn down bridges.

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# WATER TRANSPORT

## INLAND WATERWAYS

- ❑ India has 14,500 km of navigable waterways
- ❑ Includes rivers, canals, backwaters, creeks etc.
- ❑ The chief mode of transportation before the advent of railways.
- ❑ Its importance declined as it *could not compete with the speed of road and rail transport (Disadvantage)*
- ❑ Share of inland water transport in total transport in India is only around 1%



### Advantages of Water Transport:

- i. Cheapest mode of transport
- ii. Most suitable for heavy and bulky goods
- iii. Fuel-efficient
- iv. Environment-friendly

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## Inland Waterways of India

- ❑ **National Waterway 1 (NW 1):** *Allahabad-Haldia stretch of Ganga-Bhagirathi Hooghly River system*; divided into three parts for development purposes (i) Haldia-Farakka, (ii) Farakka-Patna, (iii) Patna-Allahabad. The Ganga is navigable by mechanical boats upto Haridwar.
- ❑ **National Waterway 2 (NW 2):** Sadia-Dhubri stretch of the Brahmaputra River. The Brahmaputra is shared by India and Bangladesh and is navigable by steamers upto Dibrugarh.
- ❑ **National Waterway 3 (NW 3):** Kottapuram-Koollam stretch of the West Coast Canal along with Udyogmandal and Champakara canals.
- ❑ *Rivers of South India are not much suited for navigation as they are seasonal. Some important waterways are:*
  - a) *Deltaic courses of Mahanadi, Krishna and Godavari* (Godavari is navigable upto 300 km from its mouth)
  - b) *Rivers of Goa-Mandovi and Juari*
  - c) *Lower reaches of Narmada and Tapi*
  - d) *Navigable canals, e.g. Buckingham Canal (Andhra Pradesh and Tamil Nadu), Kurnool, Cuddapah and Midnapur canals*

## FACTORS AFFECTING INLAND WATERWAYS

- i. The rivers and canals should have regular flow of sufficient water.
- ii. The presence of waterfalls, cataracts and sharp bends in the course of river hinder the development of waterways.
- iii. Silting of the riverbed reduces the depth of the water and creates problem for navigation. Desilting of river beds is a costly affair.
- iv. Diversion of water for irrigation purposes reduces the quantity of water and should be done carefully.
- v. There should be sufficient demand for waterways to make it an economically viable mode of transportation.



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## OCEANIC ROUTES

- India has 7516 km long coastline and over 2 million sq km Exclusive Economic Zone.
- 95% overseas trade carried on by seaways.
- Domestic traffic carried by coastal shipping.



## HARBOURS AND PORTS

- Harbour is a partially enclosed area in the sea, like a creek, an estuary or a sea inlet providing shelter to sailing ships. Harbours may be natural or artificial.
- Port is a place on the coast with docks, wharves and berthing facilities, where cargo in large quantities is received from oceanic routes and sent to the interior of the country through land routes and vice-versa. Ports are always man-made and play an important role in trade.

### Natural Harbour

Generally occur along indented coastlines. If an inlet or backwater bay penetrates deep inland for a long distance, it facilitates the cheap transportation of land-bound cargo.

### Artificial Harbour

Constructed by dredging and erecting a wall against the sea along the coastline.

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## Ports of India

India has 13 major ports and 200 intermediate and minor ports



Jawaharlal Nehru Port, Nhava Sheva

### Major Ports on the West Coast

#### 1. Mumbai:

- Magnificent *natural harbour* on the West Coast of India.
- **Biggest port** of India. It handles foreign trade with the Western countries and East African countries. The opening of the Suez Canal in 1869 brought it much closer to the European countries. Mumbai is a gateway to India from the west .
- **Favourable factors:**
  - i. **Natural advantages:** The deep 10-12 metre sea adjoining the natural harbour with no sand banks enables big ships to enter the port easily.
  - ii. **Vast hinterland rich in agricultural and industrial resources**, covering the whole of Maharashtra and large parts of Madhya Pradesh, Gujarat, Rajasthan, Delhi.
  - iii. **A dense network of roads and railways** connects the port with its hinterland.
- **Exports:** Cotton textiles, chemical goods.
- **Imports:** Crude oil, Superior quality raw cotton

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## 2. Jawaharlal Nehru Port:

- Formerly known as **Nhava Sheva port**, this new port has been built in 1989 at an island named *Nhava Sheva* across the famous Elephanta caves, about 10 km from Mumbai.
- **Main purpose** : To release pressure on the Mumbai port.
- **Favourable Factors**:
  - i. *The sea is quite deep near the port* - no need for dredging.
  - ii. *Linked by road and rail* to other railway routes and national highways avoiding Mumbai city altogether
  - iii. *Hinterland* is same as that of Mumbai Port (*Twin port of Mumbai*)
  - iv. *Most modern facilities* like mechanised container berths for handling dry bulk cargo, computerised operations, etc. The Nhava Sheva International Container Terminal (NSICT) became operational in 2000.

## 3. Deendayal Port (Kandla)

- **Tidal port** located at the eastern end of Gulf of Kachchh.
- Developed after independence in 1950 with the loss of Karachi port to Pakistan in 1947.
- **Main Purpose**: To relieve congestion on Mumbai port
- **Favourable factors**:
  - i. *Vast hinterland* covering large parts of Gujarat, Rajasthan, Haryana, Punjab, Delhi, Himachal Pradesh, Jammu and Kashmir and Uttaranchal.
  - ii. Well connected by *roads and railways*
- **Main items of trade**: Crude oil, Petroleum products, Cotton, Salt





#### 4. Marmagao:

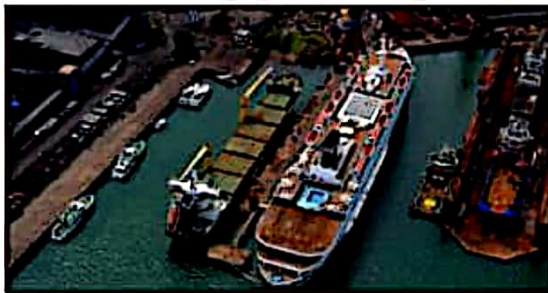
- It is an important port of Goa
- *Natural harbour* protected by a backwater
- *Comparatively small hinterland* covering the whole of Goa and parts of north Kamataka coastal region and southern Maharashtra.
- *Major items of Export* Iron ore, manganese, coconut and other nuts, cotton.

#### 5. New Mangalore:

- Located at the southern tip of the Kamataka coast.
- Initially designed for small ships; upgraded in the Fourth Five Year Plan to accommodate larger ships. A harbour was constructed so that business could be carried on throughout the year.
- *Main importance:* export of iron ore from the Kundremukh mines.
- Its *hinterland* lies in Kamataka and northern part of Kerala.
- The port is *well linked through broad gauge rail line and NH-17* with Mumbai and Kanniyakumari.
- *Major Exports:* Iron ore, tea, coffee, cashew nuts, fish, rubber etc.
- *Major Imports:* Crude oil, fertilizers, edible oils etc.

## 6. Kochi:

- Located on the coast of Kerala.
- **Favourable factors:**
  - i. A *natural harbour* in a sheltered backwater bay.
  - ii. Its *hinterland* lies mainly in Kerala and Tamil Nadu.
  - iii. It is served by a *well developed network of transport routes*.
- **Main Exports:** Tea, Coffee and Spices
- **Main Imports:** Crude oil for the Kochi Oil Refinery and chemical fertilizers.
- It is also a *ship-building centre*.



Marmagao Port



Kochi Shipyard

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## Major Ports on the East Coast

### 7. Kolkata

- **Riverine port** located on the left bank of river Hooghly about 128 km inland from the Bay of Bengal. Handles goods coming from South-East Asian countries, Australia and New Zealand; called the 'Gateway to Eastern India.
- **Vast hinterland** including almost the whole of the eastern and north-eastern India (West Bengal, Bihar, Jharkhand, Uttar Pradesh, Uttaranchal, Sikkim, Assam, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Meghalaya, Tripura and northern parts of Chhattisgarh and Madhya Pradesh).
- **Main Exports:** Jute products, Tea, Coal, Steel, Iron ore, etc.
- **Main Imports:** Machinery, Crude oil.
- **Problems of the Kolkata Port:**
  - a) River Hooghly suffers from the *problem of silting as tidal bores* enter this port frequently. *Sandy bars and islands* have been formed at several places. The depth of water is gradually declining. This has necessitated constant dredging so that larger vessels are able to enter the port.
  - b) The river is in its old stage and *bends at several places* creating lot of problems for the ships because they do not find a straight passage from the coast to the port. Expert pilots are required to conduct the ships.

**Solution:** A barrage has been constructed across the Ganga at Farakka, designed to divert water along the Bhagirathi-Hooghly. However, with the signing of water treaty between India and Bangladesh, adequate water is not available in the Hooghly River. Only a change in the treaty can improve the situation.



## 8. Haldia

- Recently been developed on the *confluence of rivers Hugli and Haldi about 105 km downstream from Kolkata.*
- **Main purpose:** To release congestion at Kolkata. It receives larger vessels which otherwise would have to go to Kolkata. Some of the large vessels which cannot enter the Kolkata port can easily come upto Haldia.
- The *hinterland* of Haldia covers the same territories as that of Kolkata although to a much lesser extent.
- An important *rail link* connects Haldia with Kharagpur.
- Haldia has an *oil refinery* and a *fertilizer factory*. A large *integrated petro-chemical plant* has also been set up here.
- **Main items of trade:** Mineral oil and Petroleum products.
- **Problems:** Haldia's future has become uncertain as the Bhagirathi River has changed its course recently. With the large-scale deposition of silt near the port (Nayachar), the entry of large ships has become difficult.

## 9. Paradwip

- Located on the Orissa coast
- **Main Exports:** Iron-ore (mainly to Japan) and coal.
- The imports through port are only half of its exports.
- The *hinterland* is comparatively small and covers Orissa only.



## 10. Vishakhapatnam

- **Deepest land-locked** and protected port at the coast of Andhra Pradesh.
- **Main Exports:** Iron ore (especially from Bailadila mines to Japan), Manganese ore, spices, fertilizers and wood.
- **Main Imports:** Crude oil, Coal.
- The *hinterland* is constituted by Andhra Pradesh and the contiguous parts of Chhattisgarh, Madhya Pradesh, Maharashtra and Karnataka.
- It also has the *ship-building and ship-repair industry*.

## 11. Chennai

- **Oldest artificial harbour** on the East Coast of India.
- The *hinterland* encompasses the large part of Tamil Nadu, southern part of Andhra Pradesh and some parts of Karnataka.
- **Main Exports:** Rice, Tobacco, Coffee, Manganese ore, Fish and fish products, Coconut, Copra etc.
- **Main Imports :** Coal, Crude oil, cotton, vehicles, etc.
- **Problems of Chennai port:**
  - i. Chennai is often hit by cyclones in October and November and shipping becomes difficult during these months.
  - ii. It is ill-suited for large ships because of the lesser depth of water near the coast.

### 12. V.O. Chidambaram Port (Tuticorin)

- Recently developed at the Tamil Nadu coast.
- **Main purpose:** To carry on trade with Sri Lanka as it is very near to that country.
- The *hinterland* is formed mainly by southern Tamil Nadu.
- **Main items of trade:** Coal, salt, food grains, edible oils, sugar and petroleum products.

### 13. Kamarajar Port Limited (Ennore)

- Newly constructed port (2001) on the coast of Tamil Nadu 25 km north of Chennai.
- **Main Purpose:** To relieve pressure on Chennai port; primarily developed as a coal port to handle thermal coal requirements of Tamil Nadu.



Kolkata port

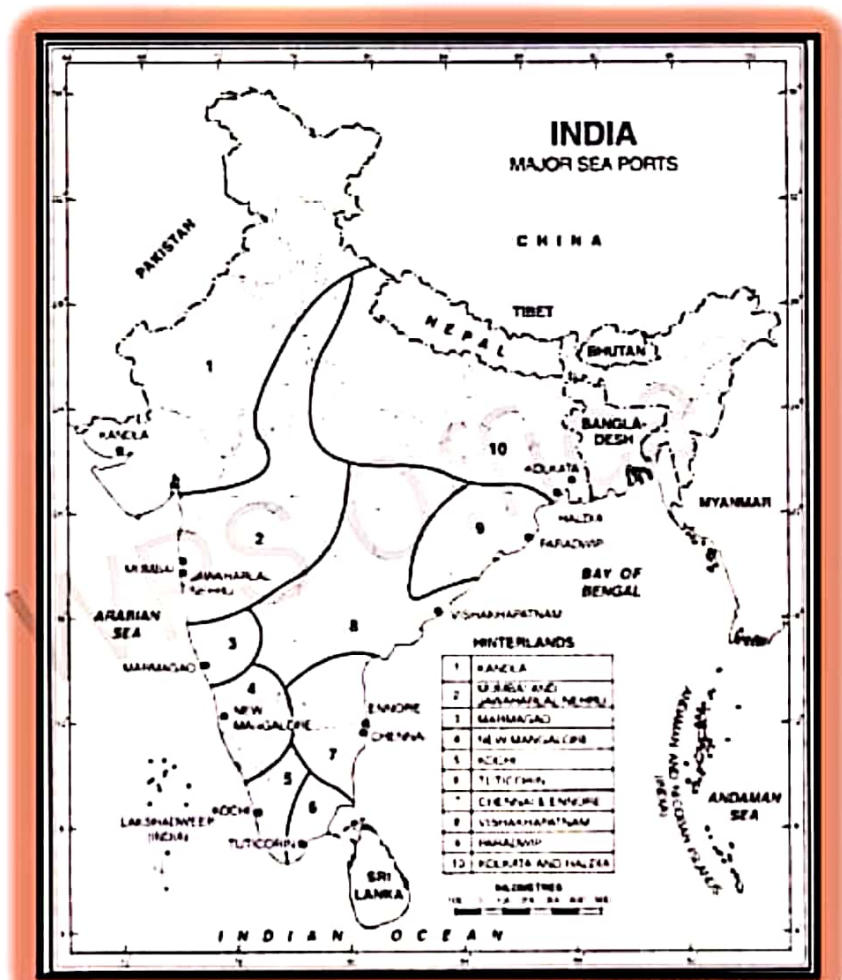


Vishakhapatnam port



Chennai port

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# AIR TRANSPORT



## Importance of Air Transport

Very essential for a vast country like India where distances are so large and the terrain and climatic conditions so diverse.

- i. Fastest mode of transport
- ii. Can easily cross and reach remote, inaccessible and hostile areas like lofty mountains, thick forests, marshy areas and sandy deserts by air transport which is almost impossible by other modes of transport.
- iii. Plays a vital role in times of emergency as well as in the event of natural and man-made calamities like floods, famines, epidemics and wars.

## Disadvantage of Air Transport

- Costliest mode of transport which many people cannot afford

Air transportation in India made a humble beginning in 1911 when air mail operation commenced over a little distance of 10 km between Allahabad and Naini.



## AIR TRANSPORT IN INDIA



### Air India

- Handles International passenger and cargo traffic;
- Operates from international airports at Delhi, Mumbai, Kolkata, Chennai, Thiruvananthapuram, Bangalore, Hyderabad, Panaji, Kochi, Amritsar, Guwahati and Ahmedabad.
- Connects India with almost all the continents of world through its services.

### Indian Airlines (Now known as 'Indian')

- Handles domestic traffic and carries passengers, cargo and mail to different places in the country.
- Also operates to 17 international destinations, mainly in south and south-east Asia.

The Government repealed the Air Corporation Act 1953 in 1994, thereby ending the monopoly of Indian Airlines and Air India on the scheduled operations. The share of private sector airways has increased rapidly, giving the passengers a wider choice of flights.

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## Vayudoot

- Set up in 1981 to provide links with remote, inaccessible and thickly forested areas of the North-Eastern region which were not covered by Indian Airlines; later merged into Indian Airlines

## Pawan Hans

- Established in 1985 to provide helicopter services to the petroleum sector including ONGC, Oil India Ltd. and Enron Oil and Gas, Mumbai High and connect remote and inaccessible areas.
- Strong presence in North-East having its helicopters deployed in the states of Arunachal Pradesh, Meghalaya, Sikkim and Tripura.
- Provides services to certain state governments such as Punjab, M.P., Lakshadweep and public sector undertakings like NTPC, GAIL, and BSF.



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# AIRPORTS



## Airports Authority of India (AAI)

- Formed by merging of erstwhile International Airports Authority of India and National Airports Authority in 1995
- Responsible for providing safe and efficient air traffic services and aeronautical communication services for effective control of air traffic in the Indian air space.
- Operates 11 international and 112 domestic airports including 28 passenger terminals at defence airfields.
- Four major International Airports:
  - i. Indira Gandhi International Airport (New Delhi)
  - ii. Netaji Subhash Chandra Bose International Airport (Kolkata)
  - iii. Chhatrapati Shivaji Maharaj International Airport at Sahar (Mumbai)
  - iv. Chennai International Airport at Menambakkam (Chennai)

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# PIPELINES

Most convenient, efficient and economical mode of transporting liquids like petroleum, petroleum products, natural gas, water, milk, etc. Even solids can also be transported through pipelines after converting them into slurry. Transportation by pipelines is a new development in India.



## Advantages of Pipelines:

- i. They are ideally suited to transport the liquids and gases.
- ii. Pipelines can be laid through difficult terrains as well as under water.
- iii. It involves very low energy consumption.
- iv. It needs very little maintenance.
- v. Pipelines are safe, accident-free and environmental friendly.

## Disadvantages of Pipelines:

- i. It is not flexible, i.e., it can be used only for a few fixed points.
- ii. Its capacity cannot be increased once it is laid.
- iii. It is difficult to make security arrangements for pipelines.
- iv. Underground pipelines cannot be easily repaired and detection of leakage is also difficult.



## Important Pipelines in India

- **Naharkatia-Nunmati-Barauni-Kanpur Pipeline:**  
The first pipeline constructed in India (1962) to bring crude oil from Naharkatia oilfield to Nunmati. It was later extended to transport crude oil to refinery at Barauni in Bihar. It is now extended to Kanpur in U.P.
- **Mumbai High-Mumbai-Ankleshwar-Koyali Pipeline:**  
Connects oilfields of Mumbai High and Gujarat with oil refinery at Koyali. Ankleshwar-Koyali pipeline was laid in 1965. Ahmadabad has been linked to Koyali for transport of petroleum products.
- **Salaya-Koyali-Mathura Pipeline:**  
Salaya in Gujarat to Mathura in U.P., later extended upto Panipat in Haryana and further to Jalandhar in Punjab. It supplies crude oil to refineries at Koyali, Mathura and Panipat.
- **Hazira-Bijapur-Jagdishpur (HBJ) Gas Pipeline:**  
Constructed by *Gas Authority of India Limited (GAIL)* to transport gas. It connects Hazira in Maharashtra to Bijapur in M.P. and Jagdishpur in U.P. It supplies gas to several power houses and fertilizer plants.
- **Jamnagar-Loni LPG Pipeline:**  
This 1,269 km long pipeline has been constructed by *Gas Authority of India Limited (GAIL)*. It connects Jamnagar in Gujarat to Loni near Delhi in U.P. and passes through the states of Gujarat, Rajasthan, Haryana and U.P. This is the *longest LPG pipeline of the world*.

## IMPORTANCE OF TRANSPORT INFRASTRUCTURE IN DEVELOPMENT

- Transport routes are the *basic economic arteries of the country*, plays a vital role in trade and commerce, forms an important *link between production and consumption*, ensuring *sustained economic growth* of a large developing country like India.
- Influences the *location of manufacturing units, cities, towns, ports* etc.
- Closely related to *industrial development* for bringing in raw materials for production and distribution of finished goods to the markets. Industries requiring heavy raw materials are located close to the raw material sources. Early development of industries took place around major ports as these were well connected by roads and railways.
- Reduces social distances, political fragmentation and economic isolation – *Promotes national integration* in a vast and diverse country like India. It also helps in defence preparedness



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