Transport and Communication

In the previous chapter, we learned about the concept of primary, secondary and Tertiary sectors in India. In this chapter, we will learn about the concept of Transport and Communication in India, how they contribute to the mobility of a skilled labour force, increasing industrial production etc. We will also learn the various modes of transportation and communication in India and their significance in our lives, the major factors related to transport and communication in India and the respective government initiatives to resolve and boost them up.

Transport

Whenever we step out of our houses to complete work for far distances the one thing that helps us reach our destination is Transportation. If we think otherwise, the economy of a country is majorly dependent upon transportation. There is the movement of goods from one city to another, movement of crops, food materials, grocery items, and many others from their source of production to the place of distribution.

Human beings use various methods to move goods, commodities, and ideas from one place to another. The adjacent diagram represented here clearly shows the different types of transportation which is practiced in India.

Land Transportation

Road Transport

India has one of the second largest road networks in the world. The total length of roads is about 56 lakh km (Annual Report 2017-18). About 85% of passenger and 70% of freight traffic are carried by roads every year. Road transport is moderately suitable for short-distance travel.

Types of Roads in India:

After India achieved Independence, a twenty-year road plan (1961) was introduced to improve the conditions of roads in India. For the purpose of construction and maintenance, roads were classified as National Highways (NH), State Highways(SH), Major District Roads, and Rural Roads.

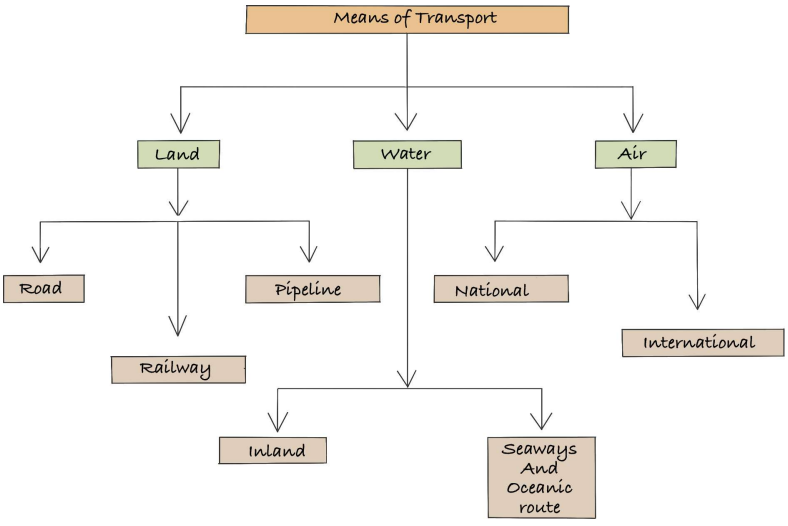
1. **National Highways** These are the primary roadways that the Central Government builds and maintains under the **National Highway Authority of India (NHAI)**. These highways connect state capitals, vital ports, major cities, and railway junctions.

National Highways Development Programme (NHDP project):

The project was launched in 1998. Its objective was to develop roads of international standards that will facilitate the smooth flow of traffic. It aims to create roads with a grade separator, a better riding surface, enhanced safety features, etc.

National Highway Authority of India

It was established in 1988 under the administrative control of the Ministry of Road Transport and Highways. It is responsible for developing, maintaining, and managing the National Highways.



Means of Transport

NHDP project is being implemented in the following seven phases:

Phase I: It included the **Golden Quadrilateral** Project. The project was launched in 1999. It comprises the construction of a 5,846-km long 4/6 lane, high-density traffic corridor, to connect India's four big metro cities of Delhi-Mumbai-Chennai Kolkata. India declared the four-lane GQ highway network complete in January 2012.

DO YOU KNOW?

Do you know?

- Kerala has the highest road density among other Indian states.
- National Highway 44 – It is the longest national highway in India with a length of 4,112 km running from Srinagar in the north to Kanyakumari in the South.
- **Zojila tunne**l will be India's longest road tunnel, and Asia's longest bi-directional tunnel when opened.
- Presently **Syama Prasad Mookerjee Tunnel** is the longest tunnel in India at 9.20 km and connects Kashmir to the rest of the country.

Phase II: It encompasses the construction of **North-South and East-West Corridors**. It aims at connecting Srinagar in Jammu and Kashmir with Kanyakumari in Tamil Nadu with a 4,076-km long road. The East-West Corridor has been planned to connect Silchar in Assam with the port town of Porbandar in Gujarat with 3,640-km of road length.The Golden Quadrilateral and corridors are linked to 10 major Indian ports, including **Kandla, Jawaharlal Nehru Port, Marmagao, New Mangalore, Kochi, Tuticorin, Ennore, Visakhapatnam, Paradip, and Haldia**.

Phase III: The government has approved NHDP-III, which will upgrade 12,109 km (7,524 mi) of national highways on a Build, Operate, and Transfer (BOT) basis. It will take into account high-density traffic, NHDP Phase I and II connectivity, and linkage to economic centers.

Phase IV: The government is considering widening a total of 20,000 kilometers of highway that was not included in Phases I, II, or III. Existing single-lane highways will be converted to two-lane highways with paved shoulders in Phase IV. The plan will be presented to the government for approval in the near future.

DO YOU KNOW?

Bharatmala umbrella scheme for roads has been launched for:

(i) Developing State roads along the coastal border area. It also includes connecting of non-major ports;

(ii) Through this program backward areas, religious and tourist places will be connected.

(iii) Setubharatam Pariyojana is launched for the construction of about 1500 major bridges and 200 rail over bridges.

Phase V: As the number of vehicles on the road increases, a number of four-lane highways will need to be renovated or expanded to six lanes. The current plan calls for the upgrading of approximately 5,000 kilometers (3,100 miles) of four-lane highways. However, the government has yet to choose the routes.

National Highways in India

Phase VI: The government is working on connecting key commercial and industrial townships by building expressways. It has already selected a 400-kilometer segment between Vadodara and Mumbai that will connect to the existing Vadodara)-Ahmedabad route.

Phase VII: This phase aims for the addition of ring roads to city road networks. It will allow for easier communication with national highways to major cities. In addition, due to population and housing growth along the roadways, as well as increased traffic, upgrades will be made to parts of national highways that require extra flyovers and bypasses. For this phase, the government has not yet selected a definite investment plan.

Do You know?

Network Survey Vehicle

The NHAI decided to deploy a Network Survey Vehicle (NSV) to enhance the quality of the national highways. Carrying out road condition surveys using NSV on the national highways was made mandatory for certifying completion of the project and every six months thereafter. The NSV uses the latest survey techniques such as a high-resolution digital camera for 3600 imagery, Record images/videos at regular intervals, laser road profilometer, etc. for measurement of distresses in road surface.

Important National Highways and their Lengths:

NH NO.	Route	Length
7	Varanasi-Rewa-Jabalpur-Nagpur-Hyderabad-Bangalore-Madurai-Kanniyakumari	2369
6	Hajira-Dhule-Nagpur-Raipur-Sambalpur Bhargora-Kolkata	1949
4	Thane-Pune-Belgaum-Hubli-Bangalore-Ranipet-Chennai	1533
5	Baharagora-Cuttack-Bhubaneshwar-Vishakhapatnam-Vijaiwada-Chennai	1533
15	Pathankot-Bhatinda-Bikaner-Samakhiali (Jaisalmer)	1526
2	Delhi-Mathura-Agra-Kanpur-Allahabad-Varanasi-Barh-Kolkata	1465
8	Delhi-Jaipur-Ajmer-Udaipur-Ahmadabad-Vadodra-Mumbai	1428
17	Panvel-Mangalore-Edapally (Kochi)	1269
3	Agra-Gwalior-Shivpuri-Indore-Dhulia-Nashik-Thane-Mumbai	1161
12	Jabalpur-Bhopal-Kota-Bundi-Jaipur	890
9	Pune-Sholapur-Hyderabad-Vijaiwada-Machlipatnam	841
150	Aizawl-Imphal-Kohima	700
13	Sholapur-Chitradurga-Mangalore	691
1A	Jalandhar-Madhopur-Jammu-Srinagar-Baramulla-Uri	663
47	Salem-Coimbatore-Thiruvananthapuram-Kanniyakumari	640
11	Agra-Bharatpur-Jaipur-Bikaner	582
28	Barauni-Muzaffarpur-Gorakhpur-Lucknow	570
58	Delhi-Mana Pass	538
16	Nizamabad-Samkhiyali-Jagdalpur	460
22	Ambala-Kalka-Shimla-Narkanda-Rampur-Shipki La	459
1	Delhi-Ambala-Jalandhar-Amritsar	456
14	Beawar-Sirohi-Radhanpur	450

NH NO.	Route	Length
49	Kochi-Madurai-Dhanushkhodi	440
24	Delhi-Bareilly-Lucknow	438
10	Delhi-Fazilka	403
18	Kurnool-Nandyal-Cuddapah-Chittor	369
21	Chandigarh-Ropar-Mandi-Kulu-Manali	323
1B	Batote-Doda-Kishtwar-Khanabal	274
4A	Belgaum-Anmode-Ponda-Panaji	153

1. **Expressways:** The Indian Road Network's highest class of roads is the expressway. An expressway is a **controlled-access highway**. It is a roadway that restricts access to and departures from it by including the design of entry and exit slip roads into the highway's overall design.
2. **The State Highways:** State governments construct and maintain these highways through their separate Public Works Departments (PWD). The State Highways connect to the National Highways, district headquarters, important towns, tourism centers, minor ports, and transport traffic through the state's major cities.
3. **District Roads** These roads are the connecting link between District Headquarters and the other important nodes in the district.
4. **Rural Roads** These roads are vital for providing links in rural areas. About 80 percent of the total road length in India is categorized as rural roads. There is regional variation in the density of rural roads because these are influenced by the nature of the terrain.

District Headquarters connectivity Scheme: The scheme is launched for the development of about 9000 km of newly declared National Highways. The program is targeted for completion by 2022.

The Asian Highway (AH)

The Asian Highway (AH) project is also known as the **Great Asian Highway**. It is a collaborative effort by Asian and European governments as well as the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) to upgrade Asia's highway infrastructure. It is one of the three pillars of the Asian Land Transport Infrastructure Development (ALTID) project. This includes Asian Highway, Trans-Asian Railway (TAR), and land transport facilitation projects. It was approved by the ESCAP Commission at its 48th session in 1992. 32 countries have signed agreements for the motorway to span the continent and reach Europe. India, Sri Lanka, Pakistan, China, Japan, South Korea, and Bangladesh are among the countries involved in the highway project.

Highway	Connecting places
AH42:	It connects Lanzhou, the capital of Gansu Province, China to Barhi in Jharkhand. This is the nearest Asian highway to Mount Everest and it passes through Lhasa in Tibet and Kathmandu in Nepal.
AH43:	It connects Agra to Matara in Sri Lanka. To reach Sri Lanka via this road, one needs to take a ferry ride from Nagapattinam in Tamil Nadu.
AH45:	It connects Kolkata to Bengaluru. The road provides one with a beautiful view from the East Coast. There is a plan to extend it from Doha in Qatar to Jakarta, Indonesia by 2030
AH46	It connects Hazirah in Gujarat to Howrah in West Bengal via Surat and Jalgaon. The road crosses five states such as West Bengal, Jharkhand, Odisha, Chhattisgarh, and Maharashtra.
AH47	Runs from Gwalior to Bengaluru. The road passes through cities such as Dhule, Thane, Mumbai, and Belgaum.
AH48	It is locally known as the SAARC Road, connecting Phuentsholing in Bhutan to the Indo-Bangladesh border point at Changrabandha in Cooch Behar, West Bengal via Dooars.

The Benefits of Road Transport:

The following are the key advantages of road transportation over other modes of transportation:

- **Less expensive travel:** Road travel is less expensive than rail travel. Its construction, repair, and maintenance costs are lower than those of railway transportation.
- **Direct deliveries:** Roads are accessible up to the consumer's home. Producers and traders prefer roads since they don't have to load and unload their goods at numerous locations. The raw materials and machines are delivered directly to the factory, and the goods are delivered safely to the consumers.
- **Short time for short travels:** Road transportation is the best option for short and medium distances. It takes less time for people and commodities to arrive at their destination.
- **Ideal for perishable goods:** Roads are ideal for moving perishable items like green vegetables, fruits, and milk.
- **No time constraint:** There is no time or travel constraint at any time or location.
- **Packaged free products:** It is not always essential to pack products in road transport. Fruits and vegetables are sometimes loaded without being packed.
- **More versatility:** Roads are a more versatile mode of transportation since they can navigate steep hills and sharp twists.

Issues with Road Transportation:

In India, there are a variety of issues with road transportation. Here are a few of them:

- **Unpaved roads:** Approximately half of India's roads are unpaved. These are only suitable for usage in dry weather. This is because they become muddy and unsuited during the rainy season.
- **Infrastructural issues:** Most National Highways have insufficient capacity, deteriorated pavements, outdated bridges, unbridged level crossings, a lack of by-pass highways, and insufficient safety measures. Traffic congestion, pollution, and road accidents increase when high-speed cars, lorries, buses, tractors, two-wheelers, animal-driven vehicles, cyclists, and other vehicles mingle with one other.
- **Various stop points on roads:** The presence of many checkpoints, toll booths, and octroi duty collecting stations on highways wastes time and slows traffic flow.
- **Amenities lacking:** Along the roadways, essential services like repair shops, first aid centers, telephones, clean bathrooms, food outlets, and rest stops are lacking.
- **Braking of road safety laws:** The laws of road safety and traffic are routinely broken by drivers. There is no effective structure in place to enforce them.
- **Old technologies:** The techniques used in road engineering and construction are outdated. It will not be able to address future problems.

Asian Highways in India

- **Irregular policies:** The policy on roadway development is not consistent, as it shifts with each change of administration.
- **Short money supply:** In India, money for the development and upkeep of roads, including motorways, are in short supply.

Pipeline Transportation

Pipeline is the newly emerging branch of transportation. It involves transportation through pipes. Pipelines are considered the most effective way of transporting liquids and gases over long distances. Crude oil, Jet fuel, LPG, Butane, gases, and coal minerals can be transported from here. Even solids can also be transported by pipelines after converting them into a slurry.

Advantages of pipeline transportation:

- Pipelines can easily be transferred from difficult terrains like hilly areas or even underwaters.
- Their operation and maintenance cost is ow
- It consumes a very small amount of energy for transportation.
- It reduces the transshipment delays and losses.
- There is a constant and steady supply of liquid and gas in the pipeline.

Disadvantages:

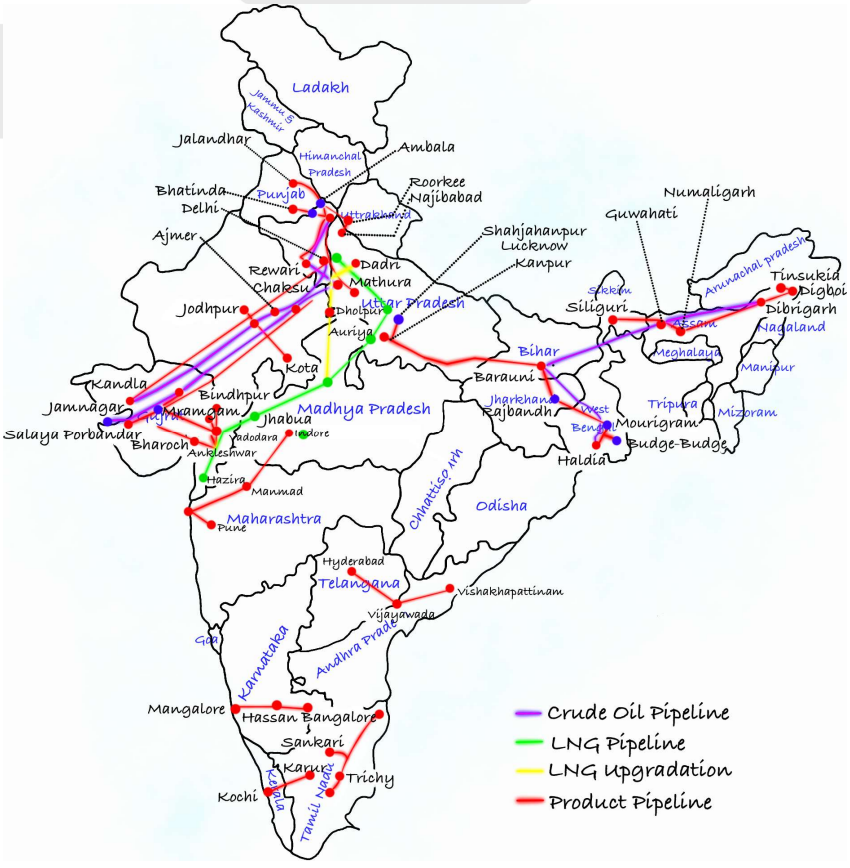
- It is very difficult to detect leakage
- Initial cost of laying the pipeline is very high.
- There are threats from terrorist organizations, especially in the case of Transboundary pipelines like the TAPI, where terrorists can blow away the pipeline.

Important Pipelines in India:

1. **Naharkatia-Nunmati-Barauni Pipeline:** It is the **first pipeline** constructed in India to bring crude oil from the Naharkatia oil field to the Noonmati oil field.
2. **Mumbai High-Mumbai-Ankleshwar-Kayoli Pipeline:** The pipeline connects the oilfields of Mumbai High and Gujarat with oil refineries at Koyali.
3. **Salaya-Koyali-Mathura Pipeline:** It has been laid from Salaya in Gujarat to Mathura in U.P. via Viramgam.
4. **Hajira-Bijapur-Jagdishpur (HBJ) Gas Pipeline:** The pipeline has been constructed by the Gas Authority of India Limited (GAIL) to transport gas. It is 1,750 km long and connects Hazira in Maharashtra to Bijapur in M.P. and Jagdishpur in U.P.
5. **Jamnagar-Loni LPG Pipeline:** The pipeline is 1,269 km long. It has been constructed by the Gas Authority of India Limited (GAIL). It connects Jamnagar in Gujarat to Loni near Delhi in U.P. The pipeline passes through the states of Gujarat, Rajasthan, Haryana, and U.P. It is the **longest LPG pipeline in the world.**
6. **Kandla-Bhatinda pipeline:** This 1,331 km long pipeline is proposed to be constructed for transporting crude oil to the proposed refinery at Bhatinda.

Railways transportation

The Indian Railways network is known as one of the longest in the world. It facilitates the movement of both passengers and freight and contributes to the growth of the Indian economy. In 1853 the Indian Railway was



Major Pipelines in India

introduced, when a line was constructed from Bombay to Thane covering a distance of 34 km. Indian Railways is the largest government undertaking in the country. The length of the Indian Railways network was 66,030 km as of 31 March 2015. The very large size of Indian railways puts a lot of pressure on centralized railway management and has been divided into 16 zones.

Sr No	Indian Railway Zone	Headquarters
1.	Northern Railway (Largest)	Baroda House, New Delhi
2.	North Eastern Railway	Gorakhpur
3.	Northeast Frontier Railway (Smallest)	Maligaon, Guwahati
4.	North Central Railway	Allahabad
5.	North Western Railway	Jaipur
6.	South East Central Railway	Bilaspur
7.	South Western Railway	Hubli
8.	South Eastern Railway	Garden Reach, Kolkata
9.	South Central Railway	Secunderabad
10.	Southern Railway	Chennai
11.	Central Railway	Mumbai
12.	Western Railway	Churchgate, Mumbai
13.	West Central Railway	Jabalpur
14.	Eastern Railway	Kolkata
15.	East Coast Railway	Bhubaneshwar
16.	East Central Railway	Hajipur
17.	Kolkata Metro	Kolkata

An extensive program has been launched by Indian Railways to convert the meter and narrow gauges into broad gauges. Moreover, diesel and electric engines have replaced steam engines. This step has increased the speed, as well as, the haulage capacity. The replacement of steam engines run by coal has also improved the environment of the stations.

Categories of Indian railways track:

Broad gauge: The distance between rails in broad gauge is 1.676 meters.

Metre gauge: The distance between rails is one meter.

Narrow gauge: The distance between the rails, in this case, is 0.762 meters or 0.610 meters. It is generally confined to hilly areas

Metro Rail in India:

Metro rail is fast becoming the most popular means of mass rapid transit in India with an operational network of over 660 km across 12 cities. The first metro in the country started operations all the way back in 1984 in Kolkata. It is also the only metro rail network that is controlled by the Indian Railways; all others are operated by autonomous local authorities.

The second oldest after Kolkata Metro is the Delhi Metro, which makes it the largest and busiest network of all. Following the success of the Delhi Metro, other cities in India also started exploring the option to implement metro projects. With this idea, more than INR 1 trillion was invested in metro projects in the year 2018-19.

Government Initiatives for Development of Metro Rails in India

Metro Rail Policy: It aims to create an enabling environment for the expansion of the metro rail system across the country

Key Features

- Multi-modal integration and Last Mile connectivity
- Flexibility of different financial models - Centre, State, Centre & State and PPPs
- Constitution of Unified Metropolitan Transport Authority (UMTA) of Urban Transport Fund

Metro lite: It is a low-cost Mass Rapid Transit System. MetroLite is planned in Rithala- Narela corridor in Delhi and other cities such as Jammu, Srinagar and Gorakhpur.

MetroNeo: It is being planned in Nasik, Maharashtra

Water Metro: It is a unique urban mass transit system with the same experience and ease of travel as that of the conventional metro system. India's first WaterMetro is under development in Kochi.

Advantages of Metro Rail System:

The Metro Rail System has proven to be the most efficient in terms of energy consumption, space occupancy, and numbers transported.

- **High-capacity carriers** – They can carry a large number of passengers.
- **Eco-friendly** – causes no air pollution, much less sound pollution.
- **Low energy consumption** – 20% less in comparison to road-based systems.

- **Greater traffic capacity** – carries as much traffic as 7 lanes of bus traffic or 24 lanes of car traffic (either way).
- **Very low ground space occupation** – 2-meter width only for elevated rail.
- **Faster** – reduces journey time by 50% to 75%.

Benefits of Rail Transportation:

The following are the key advantages of rail transportation:

- **Low-cost transportation:** Low-cost mode of transportation for people and cargo travelling large distances. Rapid mode of long-distance transportation.
- **Faster travels:** Trains may now travel at faster speeds of more than 300 kilometres per hour because of advancements in technology in railway lines, carriages and coaches, engines, and control systems. Fast trains are fashionable in Japan, France, and Germany.
- **Amenities:** Travelling by train has become much more comfortable thanks to air-conditioned coaches, superb sleeper coach arrangements, and catering.
- **Longer distance goods transport:** Trains can carry away heavy load goods and items at longer distances. Refrigerated carts are used to deliver perishable goods.

Issues with Railways in India

Railways, as the largest public-sector undertaking, faces a wide range of issues. Here are a few of them:

- **Overcrowded:** India's current railway network is overcrowded and unable to satisfy the increasing demands of a rapidly growing population.
- **Unfavorable geographical conditions:** Some locations are outside the reach of railways due to unfavorable geographical conditions like rough terrain. Railways should be built in these locations to alleviate regional economic disparities.
- **Fierce competition:** Railways are facing fierce competition from road transport, and as a result, their proportion of passenger and freight traffic is dwindling.
- **Unprofitable projects:** Due to political pressures and interference, railways are forced to develop unprofitable projects. The deficit is growing as a result of the government's refusal to raise fares and levies for political reasons.
- **The additional load of tariffs:** State Electricity Boards and NTPC arbitrarily raise tariffs, adding to the load on railways.
- **Fuel hikes:** Diesel is consumed the most by railways. Any increase in diesel prices has a negative impact on financial resources.
- **Replacement of equipment:** The majority of railway equipment is old and requires quick replacement.

Government Initiatives to boost the railways:

'Bharat Gaurav' scheme: Under this scheme theme-based tourist circuit trains will be operated either by private or State-owned operators. These will not be regular trains that will run as per a timetable but will be more on the lines of the Ramayana Express being run by the IRCTC.

National Rail Plan (NRP) for India – 2030: The Plan is to create a **'future ready'** Railway system by 2030. The NRP is aimed to formulate strategies based on both operational capacities and commercial policy initiatives to increase the modal share of the Railways in freight to 45%.

Indian Railways is also trying to incorporate new technologies like **KAVACH**, Redevelopment of Stations, and **Vande Bharat express trains**. The railways are also targeting 100% electrification on all Indian railway stations by 2023.

KAVACH: It is an anti-collision system to efficiently minimize train fatalities. It has been indigenously developed by RDSO (Research Design and Standards Organisation). It is adopted as the National Automatic Train Protection (ATP) system.

Water Transportation

Waterways were the earliest mode of transportation, before the advent of railways and airways. It is a fuel-efficient and eco-friendly mode of transport. Water transport is of two types:

(a) Inland waterways, and

(b) Oceanic waterways

Inland waterways:

Inland waterways are rivers, canals, backwaters, and creeks that are deep enough to allow the ships and boats to navigate safely. India has 14,500 km of navigable waterways, contributing about 1% to the country's transportation.

It was the main mode of transportation before the advent of railways. However, it faced tough competition from road and railway transport. Further, the diversion of river water for irrigation purposes made them non-navigable in large parts of their courses.

Conditions Required for Inland Waterways:

The following are the conditions that must be followed in order for inland water transportation to be successful in the country

- Rivers should be perennial, or there should be enough water to flow throughout the year.
- Water transportation is not possible on rivers with rapids or waterfalls.
- During the winter, the water in rivers, lakes, and canals should not freeze.
- River mouths should not be strewn with soil or sand. The depth of water is reduced when sand or soil is deposited.
- During floods, rivers should not vary their path.

Benefits of Inland Waterways

Inland rivers are beneficial in a variety of ways. These can be summed up as follows:

- Transporting large, bulky items is simple and inexpensive. Water transport is suitable for coal, various ores, wood, and large manufactured items.
- Rivers and lakes act as natural paths for transportation. It is not necessary to spend money on their development and upkeep.
- Accidents on waterways are rather rare.
- In densely forested areas with considerable rainfall, rivers are the only mode of transportation.

Limitations of Inland Waterways:

Despite the benefits described above, inland waterways have the following drawbacks:

- Due to the poor speed, time is lost. As a result, they are unfit for transporting perishable items like fruits, vegetables, and milk, as well as their by-products.
- The majority of rivers run far away from densely populated areas, where transportation demand is higher. As a result, this mode of transportation poses challenges.
- Seasonal variations in water flow and depth cause transportation issues.
- Silting of sand and soil must be removed on a regular basis to maintain the desired depth in rivers, lakes, and canals. This necessitates investment, and navigation is halted as a result.

National Waterways in India:

In 1986 the **Inland Waterways Authority of India (IWAI)** was established. It aimed to expand the inland waterways and improve their efficiency. Out of the 111 National Waterways (NWs) declared under the National Waterways Act, 2016, 13 NWs are operational for shipping and navigation and cargo/passenger vessels are moving on them. 6 important national waterways are given below and are represented on the map.

Important National Waterways in India:

National Waterway n mber	Route	States involved
NW 1	Waterway stretches from Allahabad(Prayagraj) to Haldia	UP, Bihar, Jharkhand, West Bengal
NW 2	It is established on the Brahmaputra river and runs from Sadia to Dhubri in Assam state.	Assam
NW 3	Waterway is in the state of Kerala and runs from Kollam to Kottapuram.	Kerala
NW 4	Waterway stretches from Kakinada to Pondicherry	Tamil Nadu, Andhra Pradesh, Telangana
NW 5	It connects Orissa to West Bengal using the stretch on Brahmani River	Odisha, West Bengal
NW 6	It is a proposed project and will connect Lakhipur to Bhanga in river Barak.	Assam

Natinal Waterways in India

Indian Vessels Act 2021:

The Inland Vessels Act, of 2021 replaces the Inland Vessels Act, of 1917. It aims at developing India's inland waterways as a viable, thriving mode of transport, especially for cargo. It seeks to bring all inland waterways in India and the movement of vessels on them for any purpose under a central regulatory regime.

Oceanic Waterways:

India has a vast coastline of approximately 7,517 km which includes islands. There are thirteen major and 200 minor ports that provide infrastructural support to these routes. Oceanic routes play an important role in the transport sector of India's economy. Approximately 95% of India's foreign trade by volume and 70% by value moves through ocean routes. Apart from international trade, these are also used for the purpose of transportation between the islands and the rest of the country.

There are 13 major ports in the country; 6 on the Western coast and 7 on the Eastern coast.

Important Ports in India:

Port name	State	Features
Kandla:	Gujara	It is a Tidal port. Kandla port was built soon after independence to compensate for Pakistan's loss of Karachi. Jammu and Kashmir, Himachal Pradesh, Punjab, Haryana, Delhi, Rajasthan, and Gujarat are all served by it. It deals with crude oil, petroleum products, cotton, fertilisers, food grains, cement, sugar, and edibles etc.
Mumbai	Maharashtra	It is the largest natural harbour on India's west coast. The Suez Canal, opened in 1869, brought Egypt much closer to European countries.
Nhava Sheva	Maharashtra	It has helped to relieve traffic congestion at Mumbai's port. It transports a wide range of commodities from the Middle East and Europe. In this region, it functions as a hub port.
Mormugao	Goa	It handles iron ore exports from India. It's just at the mouth of the Zuari estuary. Its prominence has grown since the establishment of the Konkan Railway. It now functions as a multi-commodity port.
New Mangalore	Karnataka	It is a new port that was built around 9 kilometres north of the old port. The port has excellent connections to Mumbai and Kanyakumari. Iron ore, manganese ore, fertilisers, tiles, cement, coffee, cashew nuts, forest goods, food grains etc are the principal cargo items from this port.
Kochi	Kerala	It is a natural port. It is regarded as the "Queen of the Arabian Sea." Kochi features a protected backwater bay that is available to travel all year. Coir goods, copra, coconut oil, tea, rubber, spices, cashew kernels, marine food, chemical fertilisers, and other items are the main export and import items. This port delivers crude oil to the Kochi Oil Refinery.
Tuticorin	Tamil Nadu	It features a man-made deep-water port and is well-connected by rail and road. Tea, spices, cotton textiles, hides and skins, edible oils, sugar, petroleum products, and other items are major exports and imports
Chennai	Tamil Nadu	It is India's oldest man made harbour, located on the country's east coast. During the months of October and November, it is frequently struck by cyclones, making shipping problematic. It is not suitable for huge ships due to the shallower water depth. Petroleum products, fertilizers, iron ore, coal, edible oils, machinery, cotton, metals, and other items are mostly handled at this port.
Visakhapatnam	Andhra Pradesh	It is India's deepest, landlocked, well-protected, and best natural harbor. To handle iron ore and petroleum, an outer harbor has been built. The shipbuilding and ship-repair industries are also present. Petroleum, fertilizers, chemicals, machinery, metals, iron ore, lumber, leather goods, and food grains are among the country's key imports and exports.
Paradip	Odisha	It is a deep-water, all-weather port about 100 kilometers east of Cuttack. It boasts the country's deepest harbor. Iron ore and coal, as well as some dry cargo, are handled at this port. The port is well connected to various parts of Orissa by train and road.
Kolkata-Haldia	West Bengal	It is one of India's most important ports. Due to the growth of the ports of Paradip and Visakhapatnam, its prominence has dwindled marginally. Kolkata has two dock systems: Kidderpore Docks and Netaji Subhash Docks, making it a truncated port. Petroleum, chemicals, edible oils, railway equipment, machinery, tea, sugar, gunnies, leather goods, lac, mica, scrap, and other items are handled at the port.

Government Initiatives to promote Oceanic waterways:

- **The Sagarmala program** is the flagship program of the Ministry of Shipping to promote port-led development in the country. The main vision of the Sagarmala Programme is to reduce logistics costs for EXIM and domestic trade with minimal infrastructure investment.
- **The Major Port Authorities Act, 2021** provides for the regulation, operation, and planning of Major Ports in India. It vests the administration, control, and management of such ports upon the Boards of Major Port Authorities. The legislation empowers these ports to perform with greater efficiency on account of increased autonomy in decision making and by modernizing their institutional framework.
- **The Maritime India Vision-2030** is a 10-year blueprint with the aim of overhauling the Indian maritime sector, which envisages a Rs 3 lakh crore investment in port projects.

Advantages of water transport:

- Less Maintenance Cost
- The transport channel is quite cheap as compared to rail and road transport.
- Heavy and bulky goods can be transported easily at little cost through water transport.
- During natural calamities like flood and rains, when rail and road transport is disrupted, relief operations can be operated through water transport.
- Water transport plays an important role in foreign trade. India's foreign trade is mainly dependent on water transport.

Disadvantages of water transport:

- It is a slow means of transport. Failure of monsoon results in a fall in the water level of rivers making navigation difficult.
- Water transport is riskier as compared to other means because there is always the danger of sinking ships or boats.

Major Sea Ports in India

Airways Transportation

Air transport is the fastest means of movement from one place to the other. It has minimised distances by reducing the travel time. It is important for a country like India, where distances are large and the terrain and climatic conditions are diverse.

The **Airport Authority of India** is the agency for providing efficient, safe air traffic and aeronautical communication services in the Indian Air Space. The authority manages around 125 airports.

DO YOU KNOW?

Indira Gandhi International Airport is the **largest and also busiest airport** in the country in terms of passenger traffic and cargo traffic in 2020 and 2021.

History of Indian Airlines

- **1911** – Air transport was launched between Allahabad and Naini in India.
- **1947** – Four major companies namely Indian National Airways, Tata Sons Limited, Air Services of India, and Deccan Airways were providing air transport in the country.
- **1951** – Bharat Airways, Himalayan Aviation Limited, Airways India and Kalinga Airlines were the other four companies who later joined air transport services.
- **1953** – Air transport was nationalised and two Corporations, Indian Airlines and Air India International were formed. Now Indian Airlines is known as 'Indian'

Government Initiatives to promote air transport in India:

- **The UDAN Scheme:** It is the most important component of National Civil Aviation Policy. UDAN is the abbreviation for 'Ude Desh Ka Aam Naagrik' The

objective of UDAN scheme is to connect small and medium cities with big cities through air service.

- **Krishi Udan 2.0 scheme:** Under this scheme, the cargo-related infrastructure will be built in airports in north-east, hilly and tribal regions to assist farmers in transporting agricultural products. A full waiver of airport charges would be granted at select airports even if the agricultural cargo is less than 50 percent of the total chargeable weight carried.
- **NextGen Airports for Bharat (NABH) Nirman** is an initiative to expand airport capacities by more than five times to handle a billion trips a year.

DO YOU KNOW?

PM Gati Shakti - National Master Plan for Multi-modal Connectivity, is a digital platform to bring 16 Ministries including Railways and Roadways together. It aims at integrated planning and coordinated implementation of infrastructure connectivity projects.

National infrastructure project: It is a first-of-its-kind, whole-of-government exercise to provide world-class infrastructure to citizens and improve their quality of life. It aims to improve project preparation and attract investments into infrastructure.Roads, Urban and Housing, Railways, Power (Conventional and Unconventional) and Irrigation will receive the most from NIP amounting to almost 80% of the funds

National Monetisation Pipeline: Under the ambitious NMP, the government has identified 13 sectors — including airports, railways, roads, shipping, gas pipeline among others— which will be privatized.

Communications in India

Communication is sending messages from one point to another. Communication systems contribute to the development of the economy and social relationships. They also help in promoting cultural unity. On the global scale, it brings diverse people of the world close to one another. Instant means of communication are extremely important in times of emergency or calamity.

Different Types of Communication System

Postal Services

Postal services are the most widely used mode of communication in India. In the country's rural areas, postal services are critical. There are four types of post offices in the postal network: Head Post Offices, Sub-Post Offices, Extra Departmental Sub-Post Offices, and Extra Departmental Branch Post Offices.

History of postal services in India:

- The first post office in India opened in 1727.
- Lord Clive established the modern postal system, which was further developed by Warren Hastings by establishing the Calcutta General Post Office (G.P.O.) in 1774.
- The Indian Post Office Act of 1898 currently governs postal services in the country.

Work done by the Department of Posts:

For more than 150 years, the Department of Posts (DoP) has been the backbone of India's communication and has played a crucial role in the country's socio-economic development. It performs the following functions:

- delivering mails,
- accepting deposits under Small Savings Schemes,
- providing life insurance cover under Postal Life Insurance (PLI) and Rural Postal Life Insurance (RPLI)
- providing retail services like bill collection, sale of forms, etc.
- Acts as an agent for the Government of India in discharging other services for citizens such as Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) wage disbursement and old age pension payments.

Other schemes/services offered by the Department of Post:

Five-star Villages: It aims to ensure universal coverage of flagship postal schemes in rural areas of the country. The scheme seeks to bridge the gaps in public awareness and reach of postal products and services, especially in interior villages. The schemes covered under the Five Star scheme include:

(i) Savings Bank accounts, Recurrent Deposit Accounts, NSC / KVP certificates,

(ii) Sukanya Samridhi Accounts/ PPF Accounts,

(iii) Funded Post Office Savings Account linked India Post Payments Bank Accounts,

(iv) Postal Life Insurance Policy/Rural Postal Life Insurance Policy and

(v) Pradhan Mantri Suraksha Bima Yojana Account / Pradhan Mantri Jeevan Jyoti Bima Yojana Account.

DARPAN – "Digital Advancement of Rural Post Office for A New India" : The Project aims to improve the quality of service, add value to services and achieve "financial inclusion" of the unbanked rural population. It seeks to provide a low-power technology solution to each Branch Postmaster (BPM) which will enable Branch Post Offices (BOs) to improve the level of services being offered to rural customers across all the states.

Fincluvation: It is an initiative to collaborate with the Fintech Startup community to co-create and innovate solutions for financial inclusion. The initiative is part of the 75th anniversary of Indian Independence and Azadi ka Amrit Mahotsav.

India Post Payments Bank (IPPB)

The India Post Payments Bank is a public sector company under the department of posts and ministry of communication where the Indian government holds 100% equity under the Department of Posts (DoP).

It offers a range of products such as savings and current accounts, money transfers, direct benefit transfers, bill and utility payments, and enterprise and merchant payments.

The fundamental mandate of IPPB is to remove barriers for the unbanked and under-banked and reach the last mile by leveraging a network comprising 160,000 post offices.

Telecommunication

Telecommunications is derived from the Greek prefix tele-, which means "far away," and the Latin word communicare, which means "to share." Telecommunication is a modern device for individual and mass communication. The telephone and public internet are important telecommunications technologies.

DO YOU KNOW?

The first mobile call in India was made in 1995.

Status of Mobile Phones and Internet Connectivity in India

- India currently is the world's second-largest telecommunications market, with over 1.20 billion subscribers. According to a study by Deloitte, India will have one billion smartphone users by 2026 with rural areas driving the sale of Internet-enabled phones.
- The government's second-highest revenue earner is the telecommunications sector. It is a huge contributor to India's GDP as every 10% increase in investment in telecom, leads to a 3.2% increase in GDP growth for India.
- Internet subscribers increased from 302.33 million in march 2015 to 833.71 million in June 2021.
- Mobile data traffic has also increased by 44% from 2018-to 21. This has helped in the development of e-health services, e-commerce, e-education, etc.

The 5G Revolution

5G is the **5th generation** mobile network. It is a new global wireless standard after 1G, 2G, 3G, and 4G networks. It enables a new kind of network that is designed to connect virtually everyone and everything together including machines, objects, and devices.

Advantages of 5G:

- Internet speeds in the high-band spectrum of 5G have been tested to be as high as 20 Gbps (gigabits per second).
- It uses higher radio frequencies that are less crowded. This enables it to transport more data at a much faster rate.
- 5G wireless technology is meant to deliver more reliability, massive network capacity increased availability and a more uniform user experience.

Issues with 5G

- **Critical infrastructures:** The technology will need a fundamental change in the application of the communication system. There is a major issue in data transfer using 5G as it can't carry data over longer distances, therefore 5G technology needs to be augmented to existing infrastructure.
- **Financial liability:** A shift from 4G to 5G technology, will require an upgrade to the latest cellular technology, resulting in financial liability falling upon consumers.
- **Capital inadequacy:** Shortage of enough capital with suitable telecom companies (like Bharti Airtel and Vodafone Idea) is delaying the allocation of 5G spectrum.
- **Digital divide:** 5G will not decrease the digital divide between rural and urban areas in the short term, rather it may increase the gap.

- **Previous technology:** 4G networks still cause frequent disruptions in internet services.

Consumers are still struggling with basic network issues like call drops and interrupted data services.

- **Interference:** It is believed that the 5G mobile service might interfere with aircraft navigation systems. Due to these reasons, Air India canceled eight flights on US routes in January 2022.

BharatNet Project: It has been launched by the government of India under the Digital India program in order to provide high-speed digital connectivity of the internet in rural areas at a very affordable price. This high-speed digital connectivity will be provided through Optical Fiber. It is the world's largest rural broadband connectivity project.

Mass-Communication

Radio and television are examples of electronic mass communication media. They have a significant impact on both individual and social life.

Radio:

- Over the years, radio has absorbed new technologies and grown stronger.
- Radio has emerged as the ultimate survivor in the decades since, adapting to the tastes of newer generations of listeners and absorbing newer technologies.

Do You know?

All India Radio (AIR) is one of the world's largest broadcast networks. The British Government established the Indian State Broadcasting Service in 1930, and it now has 415 stations that educate and entertain people in approximately 23 languages and 146 dialects. More than 92 percent of India's landmass is covered by AIR transmission.

Community radio is now playing an important role in catering to the interests of a specific area as well as broadcasting content that is popular with a local audience.

- In the 1980s and 1990s, it countered the threat posed by personal video recorders and digital compact discs by emphasizing listener-driven programming.
- By the late 1990s and early 2000s, radio stations were reinventing themselves to cater to niche audiences: there were stations devoted to specific genres of content — talk radio, punk rock stations, and so on.

Television:

With the assistance of UNESCO, television was first introduced in India on September 15, 1959. Since then, the television industry has changed as technology and time have advanced.

The growth of television in India began in the mid-1970s, with three major trigger points:

- the Satellite Instructional Television Experiment (SITE),
- the active operation of INSAT-1A, and
- the introduction of satellite TV into Indian homes by foreign programmers such as CNN, followed by Star TV, and, later, some domestic channels such as Zee TV and Sun TV.

Status:

- According to the Broadcast Audience Research Council India's TV Universe Estimates 2020, 210 million Indian households now own a television set.
- TV viewing individuals increased by 6.7 percent, reaching 892 million from 836 million in 2018, representing a 57 million increase in 2020.
- TV-owning female population increased by 7%, while the male population increased by 6%.
- In terms of age groups, the "kids" category (ages 2 to 14) experienced the greatest growth at 9 percent.

Do You know?

Broadcast Audience Research Council India is a statistical and measurement science company that is 'Of the Industry, By the Industry and For the Industry'. The company is registered with the Ministry of Information & Broadcasting (MIB) as a self-regulated, not-for-profit Joint Industry Body that provides the most authentic audience estimates of What India Watches.

OTT or Over The Top Platforms are services that offer viewers access to movies, TV shows, and other media directly through the Internet, bypassing cable or satellite systems. OTT services can be accessed through internet-connected devices like computers, smartphones, set-top boxes, and smart TVs. In 2021 the government notified the Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules 2021 to regulate OTT platforms.

Print media

It includes newspapers, periodicals, and journals. As of 2018, India had the world's second-largest newspaper market, with daily newspapers reporting a combined circulation of more than 240 million copies. Hindi-language newspapers have the largest circulation.

Satellite Communication

Satellite refers to a machine that is launched into space and moves around Earth or another body in space.

History of satellite Communication in India:

- Satellite communication in India has evolved over time and has a wide range of applications. It all began in 1962 with the establishment of the Indian National Committee for Space Research (INCOSPAR), which later became ISRO in 1969. ISRO was established with the goal of developing space technology and applying it to various national tasks.
- APPLE was India's first geostationary experimental communication satellite project from 1977 to 1983. it was successfully launched by Ariane-1 on June 19, 1981, from Kourou, French Guiana.

Communication Satellite:

A communications satellite is an artificial satellite that relays and amplifies radio telecommunications signals through a transponder. It basically creates a communication channel between a source transmitter and a receiver at different locations on earth. Communication satellites are used for television, telephone, radio, internet, and military applications. There are currently 2,134 communications satellites in the earth's orbit and these comprise both private and government organizations.

INSAT:

The Indian National Satellite (INSAT) system is one of the largest domestic communication satellite systems in the Asia-Pacific region with nine operational communication satellites placed in Geo-stationary orbit. Established in 1983 with the commissioning of INSAT-1B, it initiated a major revolution in India's communications sector and sustained the same later. GSAT-17 joins the constellation of INSAT System consisting 15 operational satellites, namely - INSAT-3A, 3C, 4A, 4B, 4CR and GSAT-6, 7, 8, 9, 10, 12, 14, 15, 16 and 18.

The INSAT system provides services to telecommunications, television broadcasting, satellite newsgathering, societal applications, weather forecasting, disaster warning and Search and Rescue operations.

GPS Aided GEO Augmented Navigation (GAGAN):

This is a Satellite-Based Augmentation System (SBAS) implemented jointly with the Airport Authority of India (AAI). The GAGAN's goal is to provide a navigation system to assist aircraft in accurate landing over the Indian airspace. GAGAN is interoperable with other international SBAS systems.

Indian Regional Navigation Satellite System (IRNSS): NavIC

This is an independent Indian Satellite based positioning system for critical National applications. The main objective is to provide Reliable Position, Navigation, and Timing services over India and its neighborhood. It aims to provide fairly good accuracy to the user. The IRNSS will provide basically two types of services:

- **Standard Positioning Service (SPS):** provided to all users
- **Restricted Service (RS):** It is an encrypted service provided only to the authorized users

To date, ISRO has built a total of nine satellites in the IRNSS series; of which eight are currently in orbit Three of these satellites are in geostationary orbit (GEO) while the remaining in geosynchronous orbits (GSO) that maintain an inclination of 29° to the equatorial plane. The IRNSS constellation was named **"NavIC" (Navigation with Indian Constellation)**

Some applications of IRNSS are:

- Terrestrial, Aerial, and Marine Navigation
- Disaster Management
- Vehicle tracking and fleet management
- Integration with mobile phones
- Precise Timing
- Mapping and Geodetic data capture
- Terrestrial navigation aid for hikers and travelers
- Visual and voice navigation for drivers

BHUVAN

- It is a well-known national geo-portal, which is being widely used by the Government, public, NGOs, and Academia.
- Bhuvan is developed with a clear focus on addressing Indian requirements for satellite Images and theme-oriented services to help in planning, monitoring, and evaluation.
- Bhuvan provides a nationwide seamless ortho-corrected image base, and thematic datasets for many natural resources, and transport networks.

Space Research Centres in India

PYQ: Prelims

Q. Consider the following pairs: (PYQ 2014)

National Highway Cities connected

1. NH 4: Chennai and Hyderabad
2. NH 6: Mumbai and Kolkata
3. NH 15: Ahmedabad and Jodhpur

Which of the above pairs is/are correctly matched?

(a) 1 and 2 only (b) 3 only (c) 1, 2 and 3 (d) None

Answer: (d)

Q. In which of the following activities are Indian Remote Sensing (IRS) satellites used? (PYQ 2015)

1. Assessment of crop productivity
2. Locating groundwater resources
3. Mineral exploration
4. Telecommunications
5. Traffic studies

Select the correct answer using the code given below

(a) 1, 2 and 3 only (b) 4 and 5 only (c) 1 and 2 only (d) 1, 2, 3, 4 and 5

Answer: (a)