

CLASS X GEOGRAPHY NOTES CONTEMPORARY INDIA

PART II



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RESOURCES AND DEVELOPMENT

- Everything available in our environment which can be used to satisfy our needs, provided, it is technologically accessible, economically feasible and culturally acceptable can be termed as 'Resource'.
- The process of transformation of things available in our environment involves an inter-dependent relationship between nature, technology and institutions.
- Human beings interact with nature through technology and create institutions to accelerate their economic development.
- Resources are a function of human activities.
- Human beings themselves are essential components of resources.



- They transform material available in our environment into resources and use them.
- These resources can be classified in the following ways– (a) On the basis of origin biotic and abiotic (b) On the basis of exhaustibility renewable and non-renewable (c) On the basis of ownership individual, community, national and international (d) On the basis of status of development potential, developed stock and reserves.
- **TYPES OF RESOURCES** 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: The resources which can be renewed or reproduced by physical, chemical or mechanical processes are known as renewable or replenishable resources. For example, solar and wind energy, water, forests and wildlife, etc.
- The renewable resource may further be divided into continuous or flow.
- Non-Renewable Resources: These occur over a very long geological time.
- Minerals and fossil fuels are examples of such resources.
- These resources take millions of years in their formation.
- Some of the resources like metals are recyclable and some like fossil fuels cannot be recycled and get exhausted with their use.
- On the Basis of Ownership Individual Resources: These are also owned privately by individuals.
- Many farmers own land which is allotted to them by government against the payment of revenue.
- In villages there are people with land ownership but there are many who are landless.
- Urban people own plots, houses and other property.
- Plantation, pasture lands, ponds, water in wells etc. are some of the examples of resources ownership by individuals.



- Community Owned Resources: There are resources which are accessible to all the members of the community.
- Village commons (grazing grounds, burial grounds, village ponds, etc.) public parks, picnic spots, playgrounds in urban areas are de facto accessible to all the people living there.
- National Resources: Technically, all the resources belong to the nation.
- The country has legal powers to acquire even private property for public good.
- Urban Development Authorities get empowered by the government to acquire land.
- All the minerals, water resources, forests, wildlife, land within the political boundaries and oceanic area up to 12 nautical miles (22.2 km) from the coast termed as territorial water and resources therein belong to the nation.
- International Resources: There are international institutions which regulate some resources.
- The oceanic resources beyond 200 nautical miles of the Exclusive Economic Zone belong to open ocean and no individual country can utilise these without the concurrence of international institutions.
- On the Basis of the Status of Development Potential Resources: Resources which are found in a region, but have not been utilised.
- For example, the western parts of India particularly Rajasthan and Gujarat have enormous potential for the development of wind and solar energy, but so far these have not been developed properly.
- Developed Resources: Resources which are surveyed and their quality and quantity have been determined for utilisation.
- The development of resources depends on technology and level of their feasibility.
- Stock: Materials in the environment which have the potential to satisfy human needs but human beings do not have the appropriate technology to access these, are included among stock.

- For example, water is a compound of two inflammable gases; hydrogen and oxygen, which can be used as a rich source of energy.
- But we do not have the required technical 'know-how' to use them for this purpose.
- Hence, it can be considered as stock.
- 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.
- These can be used for meeting future requirements.
- River water can be used for generating hydroelectric power but presently, it is being utilised only to a limited extent.
- Thus, the water in the dams, forests etc. is a reserve which can be used in the future.
- **DEVELOPMENT OF RESOURCES** Resources are vital for human survival as well as for maintaining the quality of life.
- It was believed that resources are free gifts of nature.
- As a result, human beings used them indiscriminately and this has led to the following major problems.
- Depletion of resources for satisfying the greed of few individuals.
- Accumulation of resources in few hands, which, in turn, divided the society into two segments i.e. haves and have nots or rich and poor.
- Indiscriminate exploitation of resources has led to global ecological crises such as, global warming, ozone layer depletion, environmental pollution and land degradation.
- An equitable distribution of resources has become essential for a sustained quality of life and global peace.
- If the present trend of resource depletion by a few individuals and countries continues, the future of our planet is in danger.
- Therefore, resource planning is essential for sustainable existence of all forms of life.
- Sustainable existence is a component of sustainable development.
- **RESOURCE PLANNING** Planning is the widely accepted strategy for judicious use of resources.
- It has importance in a country like India, which has enormous diversity in the availability of resources.
- There are regions which are rich in certain types of resources but are deficient in some other resources.

MEETS THE NEEDS of the PRESENT WITHOUT COMPROMISING the ability of future generations to MEET THEIR OWN NEEDS "

SUSTAINABLE DEVELOPMENT

is that which

- There are some regions which can be considered self-sufficient in terms of the availability of resources and there are some regions which have acute shortage of some vital resources.
- For example, 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.
- The state of Rajasthan is very well endowed with solar and wind energy but lacks in water resources.
- The cold desert of Ladakh is relatively isolated from the rest of the country.
- It has very rich cultural heritage but it is deficient in water, infrastructure and some vital minerals.
- This calls for balanced resource planning at the national, state, regional and local levels.
- **Resource Planning in India** Resource planning is a complex process which involves: (i) identification and inventory of resources across the regions of the country.
- This involves surveying, mapping and qualitative and quantitative estimation and measurement of the resources.
- (ii) Evolving a planning structure endowed with appropriate technology, skill and institutional set up for implementing resource development plans.
- (iii) 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 launched after Independence.
- The availability of resources is a necessary condition for the development of any region, but mere availability of resources in the absence of corresponding changes in technology and institutions may hinder development.
- There are many regions in our country that are rich in resources but these are included in economically backward regions.
- On the contrary there are some regions which have a poor resource base but they are economically developed.
- The history of colonisation reveals that rich resources in colonies were the main attractions for the foreign invaders.
- It was primarily the higher level of technological development of the colonising countries that helped them to exploit resources of other regions and establish their supremacy over the colonies.
- Therefore, resources can contribute to development only when they are accompanied by appropriate technological development and institutional changes.
- India has experienced all this in different phases of colonisation.
- Therefore, in India, development, in general, and resource development in particular does not only involve the availability of resources, but also the technology, quality of human resources and the historical experiences of the people.
- **CONSERVATION OF RESOURCES**: Resources are vital for any developmental activity.
- But irrational consumption and over-utilisation of resources may lead to socio-economic and environmental problems.
- To overcome these problems, resource conservation at various levels is important.

- LAND RESOURCES We live on land, we perform our economic activities on land and we use it in different ways.
- Thus, land is a natural resource of utmost importance.
- It supports natural vegetation, wild life, human life, economic activities, transport and communication systems.
- However, land is an asset of a finite magnitude, therefore, it is important to use the available land for various purposes with careful planning.
- India has land under a variety of relief features, namely; mountains, plateaus, plains and islands.
- About 43 per cent of the land area is plain, which provides facilities for agriculture and industry.
- Mountains account for 30 per cent of the total surface area of the country and ensure perennial flow of some rivers, provide facilities for tourism and ecological aspects.
- About 27 per cent of the area of the country is the plateau region.
- It possesses rich reserves of minerals, fossil fuels and forests.
- LAND USE PATTERN IN INDIA The use of land is determined both by physical factors such as topography, climate, soil types as well as human factors such as population density, technological capability and culture and traditions etc.
- Total geographical area of India is 3.28 million sq km.
- Land use data, however, is available only for 93 per cent of the total geographical area because the land use reporting for most of the north-east states except Assam has not been done fully.
- Moreover, some areas of Jammu and





ONCE IN AN AGRICULTURAL

YEAR



Kashmir occupied by Pakistan and China have also not been surveyed.

- The land under permanent pasture has also decreased.
- 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.
- Hence, these lands are cultivated once or twice in about two to three years and if these are included in the net sown area then the percentage of NSA in India comes to about 54 per cent of the total reporting area.
- The pattern of net sown area varies greatly from one state to another.
- It is over 80 per cent of the total area in Punjab and Haryana and less than 10 per cent in Arunachal Pradesh, Mizoram, Manipur and Andaman Nicobar Islands.
- Forest area in the country is far lower than the desired 33 per cent of geographical area, as it was outlined in the National Forest Policy (1952).
- It was considered essential for maintenance of the ecological balance.
- The livelihood of millions of people who live on the fringes of these forests depends upon it.
- A part of the land is termed as waste land and land put to other non-agricultural uses.



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- Waste land includes rocky, arid and desert areas and land put to other non-agricultural uses includes settlements, roads, railways, industry etc.
- Continuous use of land over a long period of time without taking appropriate measures to conserve and manage it, has resulted in land degradation.
- This, in turn, has serious repercussions on society and the environment.
- LAND DEGRADATION AND CONSERVATION MEASURES We have shared our land with the past generations and will have to do so with the future generations too.
- Ninety-five per cent of our basic needs for food, shelter and clothing are obtained from land.
- Human activities have not only brought about degradation of land but have also aggravated the pace of natural forces to cause damage to land.
- At present, there are about 130 million hectares of degraded land in India.
- Approximately, 28 per cent of it belongs to the category of forest degraded area, 56 per cent of it is water eroded area and the rest is affected by saline and alkaline deposits.
- Some human activities such as deforestation, over grazing, mining and quarrying too have contributed significantly in land degradation.
- Mining sites are abandoned after excavation work is complete leaving deep scars and traces of over-burdening.
- In states like Jharkhand, Chhattisgarh, Madhya Pradesh and Odisha deforestation due to mining have caused severe land degradation.
- In states like Gujarat, Rajasthan, Madhya Pradesh and Maharashtra overgrazing is one of the main reasons for land degradation.

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- In the states of Punjab, Haryana, western Uttar Pradesh, over irrigation is responsible for land degradation due to water logging leading to increase in salinity and alkalinity in the soil.
- 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.
- It retards the process of infiltration of water into the soil after it settles down on the land.
- In recent years, industrial effluents as waste have become a major source of land and water pollution in many parts of the country.
- There are many ways to solve the problems of land degradation.
- Afforestation and proper management of grazing can help to some extent.
- 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.



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- Proper management of waste lands, control of mining activities, proper discharge and disposal
 of industrial effluents and wastes after treatment can reduce land and water degradation in
 industrial and suburban areas.
- SOIL AS A RESOURCE Soil is the most important renewable natural resource.
- It is the medium of plant growth and supports different types of living organisms on the earth.
- The soil is a living system.
- It takes millions of years to form soil up to a few cm in depth.
- Relief, parent rock or bed rock, climate, vegetation and other forms of life and time are important factors in the formation of soil.
- Various forces of nature such as change in temperature, actions of running water, wind and glaciers, activities of decomposers etc. contribute to the formation of soil.
- Chemical and organic changes which take place in the soil are equally important.
- Soil also consists of organic (humus) and inorganic materials.
- On the basis of the factors responsible for soil formation, colour, thickness, texture, age, chemical and physical properties, the soils of India can be classified in different types.
- CLASSIFICATION OF SOILS
- Alluvial Soils This is the most widely spread and important soil.
- In fact, the entire northern plains are made of alluvial soil.
- These have been deposited by three important Himalayan river systems the Indus, the Ganga and the Brahmaputra.
- These soils also extend in Rajasthan and Gujarat through a narrow corridor.
- Alluvial soil is also found in the eastern coastal plains particularly in the deltas of the Mahanadi, the Godavari, the Krishna and the Kaveri rivers.
- The alluvial soil consists of various proportions of sand, silt and clay.
- As we move inlands towards the river valleys, soil particles appear somewhat bigger in size.
- In the upper reaches of the river valley i.e. near the place of the break of slope, the soils are coarse.
- Such soils are more common in piedmont plains such as Duars, Chos and Terai.
- Apart from the size of their grains or components, soils are also described on the basis of their age.
- According to their age alluvial soils can be classified as old alluvial (Bangar) and new alluvial (Khadar).
- The bangar soil has higher concentration of kanker nodules than the Khadar.
- It has more fine particles and is more fertile than the bangar.
- Alluvial soils as a whole are very fertile.
- Mostly these soils contain adequate proportion of potash, phosphoric acid and lime which are ideal for the growth of sugarcane, paddy, wheat and other cereal and pulse crops.



- Due to its high fertility, regions of alluvial soils are intensively cultivated and densely populated.
- Soils in the drier areas are more alkaline and can be productive after proper treatment and irrigation.
- Black Soil These soils are black in colour and are also known as regur soils.
- Black soil is ideal for growing cotton and is also known as black cotton soil.
- It is believed that climatic condition along with the parent rock material are the important factors for the formation of black soil.
- This type of soil is typical of the Deccan trap (Basalt) region spread over northwest Deccan plateau and is made up of lava flows.
- They cover the plateaus of Maharashtra, Saurashtra, Malwa, Madhya Pradesh and Chhattisgarh and extend in the south east direction along the Godavari and the Krishna valleys.
- The black soils are made up of extremely fine i.e. clayey material.
- They are well-known for their capacity to hold moisture.
- In addition, they are rich in soil nutrients, such as calcium carbonate, magnesium, potash and lime.
- These soils are generally poor in phosphoric contents.
- They develop deep cracks during hot weather, which helps in the proper aeration of the soil.
- These soils are sticky when wet and difficult to work on unless tilled immediately after the first shower or during the pre-monsoon period.
- Red and Yellow Soils Red soil develops on crystalline igneous rocks in areas of low rainfall in the eastern and southern parts of the Deccan plateau.
- Yelllow and red soils are also found in parts of Odisha, Chhattisgarh, southern parts of the middle Ganga plain and along the piedmont zone of the Western Ghats.
- These soils develop a reddish colour due to diffusion of iron in crystalline and metamorphic rocks.
- It looks yellow when it occurs in a hydrated form.
- Laterite Soil Laterite has been derived from the Latin word 'later' which means brick.
- The laterite soil develops in areas with high temperature and heavy rainfall.
- This is the result of intense leaching due to heavy rain.
- Humus content of the soil is low because most of the microorganisms, particularly the decomposers, like bacteria, get destroyed due to high temperature.
- Laterite soils are suitable for cultivation with adequate doses of manures and fertilizers.
- These soils are mainly found in Karnataka, Kerala, Tamil Nadu, Madhya Pradesh, and the hilly areas of Odisha and Assam.
- After adopting appropriate soil conservation techniques particularly in the hilly areas of Karnataka, Kerala and Tamil Nadu, this soil is very useful for growing tea and coffee.
- Red laterite soils in Tamil Nadu, Andhra Pradesh and Kerala are more suitable for crops like cashew nut.
- Arid Soils Arid soils range from red to brown in colour.
- They are generally sandy in texture and saline in nature.
- In some areas the salt content is very high and common salt is obtained by evaporating the water.

- Due to the dry climate, high temperature, evaporation is faster and the soil lacks humus and moisture.
- The lower horizons of the soil are occupied by Kankar because of the increasing calcium content downwards.

- The Kankar layer formations in the bottom horizons restrict the infiltration of water.
- After proper irrigation these soils become cultivable as has been in the case of western Rajasthan.
- Forest Soils These soils are found in the hilly and mountainous areas where sufficient rain forests are available.
- The soils texture varies according to the mountain environment where they are formed.
- They are loamy and silty in valley sides and coarse grained in the upper slopes.
- In the snow covered areas of Himalayas, these soils experience denudation and are acidic with low humus content.
- The soils found in the lower parts of the valleys particularly on the river terraces and alluvial fans are fertile.





FOREST AND WILDLIFE RESOURCES

- FLORA AND FAUNA IN INDIA India is one of the world's richest countries in terms of its vast array of biological diversity, and has nearly 8 per cent of the total number of species in the world (estimated to be 1.6 million).
- This is possibly twice or thrice the number yet to be discovered.
- These diverse flora and fauna are so well integrated in our daily life that we take these for granted.
- But, lately, they are under great stress mainly due to insensitivity to our environment.
- Some estimates suggest that at least 10 per cent of India's recorded wild flora and 20 per cent of its mammals are on the threatened list.
- Many of these would now be categorised as 'critical', that is on the verge of extinction like the cheetah, pink-headed duck, mountain quail, forest spotted owlet, and plants like madhuca insignis (a wild variety of mahua) and hubbardia heptaneuron, (a species of grass).
- In fact, no one can say how many species may have already been lost.
- We have transformed nature into a resource obtaining entity, directly and indirectly eg. from the forests and wildlife wood, barks, leaves, rubber, medicines, dyes, food, fuel, fodder, manure, etc. and have depleted our forests and wildlife.
- The greatest damage inflicted on Indian forests was during the colonial period due to the expansion of the railways, agriculture, commercial and scientific forestry and mining activities.
- Even after Independence, agricultural expansion continues to be one of the major causes of depletion of forest resources.
- Between 1951 and 1980, according to the Forest Survey of India, over 26,200 sq.km. of forest area was converted into agricultural land all over India.
- Substantial parts of the tribal belts, especially in the northeastern and central India, have been deforested or degraded by shifting cultivation (jhum), a type of 'slash and burn' agriculture.
- Large-scale development projects have also contributed significantly to the loss of forests.
- Since 1951, over 5,000 sq km of forest was cleared for river valley projects.
- Clearing of forests is still continuing with projects like the Narmada Sagar Project in Madhya Pradesh, which would inundate 40,000 hectares of forest.
- Mining is another important factor behind deforestation.
- The Buxa Tiger Reserve in West Bengal is seriously threatened by the ongoing dolomite mining.
- It has disturbed the natural habitat of many species and blocked the migration route of several others, including the great Indian elephant.
- Many foresters and environmentalists hold the view that the greatest degrading factors behind the depletion of forest resources are grazing and fuel-wood collection.
- Though, there may be some substance in their argument, yet, the fact remains that a substantial part of the fuel-fodder demand is met by lopping rather than by felling entire trees.

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- The forest ecosystems are repositories of some of the country's most valuable forest products, minerals and other resources that meet the demands of the rapidly expanding industrialurban economy.
- These protected areas, thus mean different things to different people, and therein lies the fertile ground for conflicts.
- Habitat destruction, hunting, poaching, over-exploitation, environmental pollution, poisoning and forest fires are factors, which have led to the decline in India's biodiversity.
- Other important causes of environmental destruction are unequal access, inequitable consumption of resources and differential sharing of responsibility for environmental well-being.
- Over-population in third world countries is often cited as the cause of environmental degradation.
- However, an average American consumes 40 times more resources than an average Somalian.
- Similarly, the richest five per cent of Indian society probably cause more ecological damage because of the amount they consume than the poorest 25 per cent.
- The former shares minimum responsibilities for environmental wellbeing.
- The destruction of forests and wildlife is not just a biological issue.
- The biological loss is strongly correlated with the loss of cultural diversity.
- Such losses have increasingly marginalised and impoverished many indigenous and other forest-dependent communities, who directly depend on various components of the forest and wildlife for food, drink, medicine, culture, spirituality, etc.
- Within the poor, women are affected more than men.

In many societies, women bear the major



responsibility of collection of fuel, fodder, water and other basic subsistence needs.

- As these resources are depleted, the drudgery of women increases and sometimes they have to walk for more than 10 km to collect these resources.
- This causes serious health problems for women and negligence of home and children because of the increased hours of work, which often has serious social implications.
- The indirect impact of degradation such as severe drought or deforestation-induced floods, etc. also hits the poor the hardest.
- Poverty in these cases is a direct outcome of environmental destruction.
- Therefore, forest and wildlife, are vital to the quality of life and environment in the subcontinent.
- It is imperative to adapt to sound forest and wildlife conservation strategies.
- **CONSERVATION OF FOREST AND WILDLIFE IN INDIA** Conservation in the background of rapid decline in wildlife population and forestry has become essential.
- Conservation preserves the ecological diversity and our life support systems water, air and soil.
- It also preserves the genetic diversity of plants and animals for better growth of species and breeding.
- For example, in agriculture, we are still dependent on traditional crop varieties.
- Fisheries too are heavily dependent on the maintenance of aquatic biodiversity.
- In the 1960s and 1970s, conservationists demanded a national wildlife protection programme.
- The Indian Wildlife (Protection) Act was implemented in 1972, with various provisions for protecting habitats.
- An all-India list of protected species was also published.
- The thrust of the programme was towards protecting the remaining population of certain endangered species by banning hunting, giving legal protection to their habitats, and restricting trade in wildlife.
- Subsequently, central and many state governments established national parks and wildlife sanctuaries.
- The central government also announced several projects for protecting specific animals, which were gravely threatened, including the tiger, the one-horned rhinoceros, the Kashmir stag or hangul, three types of crocodiles fresh water crocodile, saltwater crocodile and the Gharial, the Asiatic lion, and others.
- Most recently, the Indian elephant, black buck (chinkara), the great Indian bustard (godawan) and the snow leopard, etc. have been given full or partial legal protection against hunting and trade throughout India.
- The conservation projects are now focusing on biodiversity rather than on a few of its components.
- There is now a more intensive search for different conservation measures.
- Increasingly, even insects are beginning to find a place in conservation planning.
- In the notification under Wildlife Act of 1980 and 1986, several hundred butterflies, moths, beetles, and one dragonfly have been added to the list of protected species.
- In 1991, for the first time plants were also added to the list, starting with six species.
- **TYPES AND DISTRIBUTION OF FOREST AND WILDLIFE RESOURCES** Even if we want to conserve our vast forest and wildlife resources, it is rather difficult to manage, control and regulate them.

- In India, much of its forest and wildlife resources are either owned or managed by the government through the Forest Department or other government departments.
- These are classified under the following categories.
- Reserved Forests: More than half of the total forest land has been declared reserved forests.
- Reserved forests are regarded as the most valuable as far as the conservation of forest and wildlife resources are concerned.



- Protected Forests: Almost one-third of the total forest area is protected forest, as declared by the Forest Department.
- This forest land are protected from any further depletion.
- Unclassed Forests: These are other forests and wastelands belonging to both government and private individuals and communities.
- Reserved and protected forests are also referred to as permanent forest estates maintained for the purpose of producing timber and other forest produce, and for protective reasons.
- Madhya Pradesh has the largest area under permanent forests, constituting 75 per cent of its total forest area.
- Jammu and Kashmir, Andhra Pradesh, Uttarakhand, Kerala, Tamil Nadu, West Bengal, and Maharashtra have large percentages of reserved forests of its total forest area whereas Bihar, Haryana, Punjab, Himachal Pradesh, Odisha and Rajasthan have a bulk of it under protected forests.
- All Northeastern states and parts of Gujarat have a very high percentage of their forests as unclassed forests managed by local communities.
- COMMUNITY AND CONSERVATION Conservation strategies are not new in our country.
- We often ignore that in India, forests are also home to some of the traditional communities.
- In some areas of India, local communities are struggling to conserve these habitats along with government officials, recognising that only this will secure their own long-term livelihood.
- In Sariska Tiger Reserve, Rajasthan, villagers have fought against mining by citing the Wildlife Protection Act.
- In many areas, villagers themselves are protecting habitats and explicitly rejecting government involvement.
- The inhabitants of five villages in the Alwar district of Rajasthan have declared 1,200 hectares of forest as the Bhairodev Dakav 'Sonchuri', declaring their own set of rules and regulations which do not allow hunting, and are protecting the wildlife against any outside encroachments.
- The famous Chipko movement in the Himalayas has not only successfully resisted deforestation in several areas but has also shown that community afforestation with indigenous species can be enormously successful.

Attempts to revive the traditional conservation methods or developing new methods of ecological farming are now widespread.



- Farmers and citizen's groups like the Beej Bachao Andolan in Tehri and Navdanya have shown that adequate levels of diversified crop production without the use of synthetic chemicals are possible and economically viable.
- In India joint forest management (JFM) programme furnishes a good example for involving local communities in the management and restoration of degraded forests.
- The programme has been in formal existence since 1988 when the state of Odisha passed the first resolution for joint forest management.
- JFM depends on the formation of local (village) institutions that undertake protection activities mostly on degraded forest land managed by the forest department.
- In return, the members of these communities are entitled to intermediary benefits like nontimber forest produces and share in the timber harvested by 'successful protection'.
- The clear lesson from the dynamics of both environmental destruction and reconstruction in India is that local communities everywhere have to be involved in some kind of natural resource management.
- But there is still a long way to go before local communities are at the centre-stage in decisionmaking.
- Accept only those economic or developmental activities that are people centric, environment-friendly and economically rewarding.



WATER RESOURCES

- Three-fourth of the earth's surface is covered with water, but only a small proportion of it accounts for freshwater that can be put to use.
- This freshwater is mainly obtained from surface run off and ground water that is continually being renewed and recharged through the hydrological cycle.
- All water moves within the hydrological cycle ensuring that water is a renewable resource.
- WATER SCARCITY AND THE NEED FOR WATER CONSERVATION AND MANAGEMENT The moment we speak of water shortages, we immediately associate it with regions having low rainfall or those that are drought prone.
- We instantaneously visualise the deserts of Rajasthan and women balancing many 'matkas' (earthen pots) used for collecting and storing water and travelling long distances to get water.
- The availability of water resources varies over space and time, mainly due to the variations in seasonal and annual precipitation, but water scarcity in most cases is caused by over-exploitation, excessive use and unequal access to water among different social groups.
- Freshwater can be obtained directly from precipitation, surface run off and groundwater.
- Water scarcity may be an outcome of large and growing population and consequent greater demands for water, and unequal access to it.
- A large population means more water not only for domestic use but also to produce more food.
- Hence, to facilitate higher food-grain production, water resources are being over-exploited to expand irrigated areas and dry-season agriculture.
- It may lead to falling groundwater levels, adversely affecting water availability and food security of the people.
- Post-independent India witnessed intensive industrialisation and urbanisation, creating vast opportunities for us.
- Today, large industrial houses are as commonplace as the industrial units of many MNCs.
- The ever increasing number of industries has made matters worse by exerting pressure on existing freshwater resources.
- Industries, apart from being heavy users of water, also require power to run them.
- Much of this energy comes from hydroelectric power.
- Today, in India hydroelectric power contributes approximately 22 per cent of the total electricity produced.
- Moreover, multiplying urban centres with large and dense populations and urban lifestyles have not only added to water and energy requirements but have further aggravated the problem.
- Most of these have their own groundwater pumping devices to meet their water needs.
- Fragile water resources are being over-exploited and have caused their depletion in several of these cities.
- In other another situation where water is sufficiently available to meet the needs of the people, but, the area still suffers from water scarcity.
- This scarcity may be due to bad quality of water.

- Lately, there has been a growing concern that even if there is ample water to meet the needs of the people, much of it may be polluted by domestic and industrial wastes, chemicals, pesticides and fertilisers used in agriculture, thus, making it hazardous for human use.
- The need of the hour is to conserve and manage our water resources, to safeguard ourselves from health hazards, to ensure food security, continuation of our livelihoods and productive activities and also to prevent degradation of our natural ecosystems.
- Over exploitation and mismanagement of water resources will impoverish this resource and cause ecological crisis that may have profound impact on our lives.
- MULTI-PURPOSE RIVER PROJECTS AND INTEGRATED WATER RESOURCES MANAGEMENT Archaeological and historical records show that from ancient times we have been constructing sophisticated hydraulic structures like dams built of stone rubble, reservoirs or lakes, embankments and canals for irrigation.
- Not surprisingly, we have continued this tradition in modern India by building dams in most of our river basins.
- Dams were traditionally built to impound rivers and rainwater that could be used later to irrigate agricultural fields.
- Today, dams are built not just for irrigation but for electricity generation, water supply for domestic and industrial uses, flood control, recreation, inland navigation and fish breeding.
- Hence, dams are now referred to as multi-purpose projects where the many uses of the impounded water are integrated with one another.
- For example, in the Sutluj-Beas river basin, the Bhakra Nangal project water is being used both for hydel power production and irrigation.
- Similarly, the Hirakud project in the Mahanadi basin integrates conservation of water with flood control.
- Multi-purpose projects, launched after Independence with their integrated water resources management approach, were thought of as the vehicle that would lead the nation to development and progress, overcoming the handicap of its colonial past.
- Jawaharlal Nehru proudly proclaimed the dams as the 'temples of modern India'; the reason being that it would integrate development of agriculture and the village economy with rapid industrialisation and growth of the urban economy.
- In recent years, multi-purpose projects and large dams have come under great scrutiny and opposition for a variety of reasons.
- Regulating and damming of rivers affect their natural flow causing poor sediment flow and excessive sedimentation at the bottom of the reservoir, resulting in rockier stream beds and poorer habitats for the rivers' aquatic life.
- Dams also fragment rivers making it difficult for aquatic fauna to migrate, especially for spawning.
- The reservoirs that are created on the floodplains also submerge the existing vegetation and soil leading to its decomposition over a period of time.
- Multi-purpose projects and large dams have also been the cause of many new social movements like the 'Narmada Bachao Andolan' and the 'Tehri Dam Andolan' etc.
- Resistance to these projects has primarily been due to the large-scale displacement of local communities.

- Local people often had to give up their land, livelihood and their meagre access and control over resources for the greater good of the nation.
- Irrigation has also changed the cropping pattern of many regions with farmers shifting to water intensive and commercial crops.

BrainyIAS

• This has great ecological consequences like salinisation of the soil.



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landscape i.e. increasing the social gap between the richer landowners and the landless poor.

- As we can see, the dams did create conflicts between people wanting different uses and benefits from the same water resources.
- In Gujarat, the Sabarmati-basin farmers were agitated and almost caused a riot over the higher priority given to water supply in urban areas, particularly during droughts.
- Inter-state water disputes are also becoming common with regard to sharing the costs and benefits of the multi-purpose project.
- Most of the objections to the projects arose due to their failure to achieve the purposes for which they were built.
- Ironically, the dams that were constructed to control floods have triggered floods due to sedimentation in the reservoir.
- Moreover, the big dams have mostly been unsuccessful in controlling floods at the time of excessive rainfall.
- The floods have not only devastated life and property but also caused extensive soil erosion.
- Sedimentation also meant that the flood plains were deprived of silt, a natural fertiliser, further adding on to the problem of land degradation.
- It was also observed that the multi-purpose projects induced earthquakes, caused waterborne diseases and pests and pollution resulting from excessive use of water.
- **RAINWATER HARVESTING** Many thought that given the disadvantages and rising resistance against the multi-purpose projects, water harvesting system was a viable alternative, both socioeconomically and environmentally.
- In ancient India, along with the sophisticated hydraulic structures, there existed an extraordinary tradition of water-harvesting system.
- People had in-depth knowledge of rainfall regimes and soil types and developed wide ranging techniques to harvest rainwater, groundwater, river water and flood water in keeping with the local ecological conditions and their water needs.
- In hill and mountainous regions, people built diversion channels like the 'guls' or 'kuls' of the Western Himalayas for agriculture.
- 'Rooftop rain water harvesting' was commonly practised to store drinking water, particularly in Rajasthan.
- In the flood plains of Bengal, people developed inundation channels to irrigate their fields.
- In arid and semi-arid regions, agricultural fields were converted into rain fed storage structures that allowed the water to stand and moisten the soil like the 'khadins' in Jaisalmer and 'Johads' in other parts of Rajasthan.
- In the semi-arid and arid regions of Rajasthan, particularly in Bikaner, Phalodi and Barmer, almost all the houses traditionally had underground tanks or tankas for storing drinking water.
- The tanks could be as large as a big room; one household in Phalodi had a tank that was 6.1 metres deep, 4.27 metres long and 2.44 metres wide.
- The tankas were part of the well-developed rooftop rainwater harvesting system and were built inside the main house or the courtyard.
- They were connected to the sloping roofs of the houses through a pipe.

- Rain falling on the rooftops would travel down the pipe and was stored in these underground 'tankas'.
- The first spell of rain was usually not collected as this would clean the roofs and the pipes.
- The rainwater from the subsequent showers was then collected.
- The rainwater can be stored in the tankas till the next rainfall making it an extremely reliable source of drinking water when all other sources are dried up, particularly in the summers.
- Rainwater, or palar pani, as commonly referred to in these parts, is considered the purest form of natural water.
- Many houses constructed underground rooms adjoining the 'tanka' to beat the summer heat as it would keep the room cool.
- Today, in western Rajasthan, sadly the practice of rooftop rainwater harvesting is on the decline as plenty of water is available due to the perennial Rajasthan Canal, though some houses still maintain the tankas since they do not like the taste of tap water.
- Fortunately, in many parts of rural and urban India, rooftop rainwater harvesting is being successfully adapted to store and conserve water.
- In Gendathur, a remote backward village in Mysuru, Karnataka, villagers have installed, in their household's rooftop, rainwater harvesting system to meet their water needs.
- Nearly 200 households have installed this system and the village has earned the rare distinction of being rich in rainwater.
- Gendathur receives an annual precipitation of 1,000 mm, and with 80

THE BENEFITS OF
RAINWATER
ARANATER
Minimises our reliance on water storage dams
Reduces your water bill significantly
Decreases the likelihood of overloading the stormwater systems
Helps in reducing floods and soil erosion

BrainyIAS

• Rainwater is more suitable for irrigation since they contain less chemicals found in ground water

per cent of collection efficiency and of about 10 fillings, every house can collect and use about 50,000 litres of water annually.

• From the 20 houses, the net amount of rainwater harvested annually amounts to 1,00,000 litres.

AGRICULTURE

- India is an agriculturally important country.
- Two-thirds of its population is engaged in agricultural activities.
- Agriculture is a primary activity, which produces most of the food that we consume.
- Besides food grains, it also produces raw material for various industries.
- Moreover, some agricultural products like tea, coffee, spices, etc. are also exported.
- **TYPES OF FARMING** Agriculture is an age-old economic activity in our country.
- Over these years, cultivation methods have changed significantly depending upon the characteristics of physical environment, technological know-how and socio-cultural practices.
- Farming varies from subsistence to commercial type.
- At present, in different parts of India, the following farming systems are practised.
- Primitive Subsistence Farming This type of farming is still practised in few pockets of India.
- Primitive subsistence agriculture is practised on small patches of land with the help of primitive tools like hoe, dao and digging sticks, and family/community labour.
- This type of farming depends upon monsoon, natural fertility of the soil and suitability of other environmental conditions to the crops grown.
- It is a 'slash and burn' agriculture.
- Farmers clear a patch of land and produce cereals and other food crops to sustain their family.
- When the soil fertility decreases, the farmers shift and clear a fresh patch of land for cultivation.
- This type of shifting allows Nature to replenish the fertility of the soil through natural processes; land productivity in this type of agriculture is low as the farmer does not use fertilisers or other modern inputs.
- It is known by different names in different parts of the



BrainyIAS

country.

- It is jhumming in north-eastern states like Assam, Meghalaya, Mizoram and Nagaland; Pamlou in Manipur, Dipa in Bastar district of Chhattishgarh, and in Andaman and Nicobar Islands.
- Intensive Subsistence Farming This type of farming is practised in areas of high population pressure on land.
- It is labour intensive farming, where high doses of biochemical inputs and irrigation are used for obtaining higher
- production. Though the 'right • of inheritance' leading to the division of land among successive generations has rendered landholding size uneconomical, the farmers continue to take maximum output from the limited land in the absence of alternative source of livelihood.
- Thus, there is enormous pressure on agricultural land.
- Commercial

Farming The main characteristic of this type of farming is the use of higher doses of modern inputs, e.g. high yielding variety (HYV) seeds, chemical fertilisers, insecticides and pesticides in order to obtain higher productivity.

- The degree of commercialisation of agriculture varies from one region to another.
- For example, rice is a commercial crop in Haryana and Punjab, but in Odisha, it is a subsistence crop.
- Plantation is also a type of commercial farming.
- In this type of farming, a single crop is grown on a large area.
- The plantation has an interface of agriculture and industry.
- Plantations cover large tracts of land, using capital intensive inputs, with the help of migrant labourers.
- All the produce is used as raw material in respective industries.
- In India, tea, coffee, rubber, sugarcane, banana, etc. are important plantation crops.
- Tea in Assam and North Bengal coffee in Karnataka are some of the important plantation crops grown in these states.



- Since the production is mainly for market, a well-developed network of transport and communication connecting the plantation areas, processing industries and markets plays an important role in the development of plantations.
- CROPPING Various types of food and fibre crops, vegetables and fruits, spices and condiments, etc. constitute some of the important crops grown in the country.

- India has three cropping seasons rabi, kharif and zaid.
- Rabi crops are sown in winter from October to December and harvested in summer from April to June.
- Some of the important rabi crops are wheat, barley, peas, gram and mustard.
- Though, these crops are grown in large parts of India, states from the north and northwestern parts such as Punjab, Haryana, Himachal Pradesh, Jammu and Kashmir, Uttarakhand and Uttar Pradesh are important for the production of wheat and other rabi crops.
- Availability of precipitation during winter months due to the western temperate cyclones helps in the success of these crops.
- However, the success of the green revolution in Punjab, Haryana, western Uttar Pradesh and parts of Rajasthan has also been an important factor in the growth of the abovementioned rabi crops.
- Kharif crops are grown with the onset of monsoon in different parts of the country and these are harvested in September-October.
- Important crops grown during this season are paddy, maize, jowar, bajra, tur (arhar), moong, urad, cotton, jute, groundnut and soyabean.
- Some of the most important rice-growing regions are Assam, West Bengal, coastal regions of Odisha, Andhra Pradesh, Telangana, Tamil Nadu, Kerala and Maharashtra, particularly the (Konkan coast) along with Uttar Pradesh and Bihar.
- Recently, paddy has also become an important crop of Punjab and Haryana.
- In states like Assam, West Bengal and Odisha, three crops of paddy are grown in a year. These are Aus, Aman and Boro.
- In between the rabi and the kharif seasons, there is a short season during the summer months known as the Zaid season.
- Some of the crops produced during 'zaid' are watermelon, muskmelon, cucumber, vegetables and fodder crops.
- Sugarcane takes almost a year to grow.
- MAJOR CROPS A variety of food and non-food crops are grown in different parts of the country depending upon the variations in soil, climate and cultivation practices.
- Major crops grown in India are rice, wheat, millets, pulses, tea, coffee, sugarcane, oil seeds, cotton and jute, etc.

- Rice: It is the staple food crop of a majority of the people in India.
- Our country is the second largest producer of rice in the world after China.
- It is a kharif crop which requires high temperature, (above 25°C) and high humidity with annual rainfall above 100 cm.
- In the areas of less rainfall, it grows with the help of irrigation.
- Rice is grown in the plains of north and north-eastern India, coastal areas and the deltaic regions.
- Development of dense network of canal irrigation and tubewells have made it possible to grow rice in areas of less rainfall such as Punjab, Haryana and western Uttar Pradesh and parts of Rajasthan.

Rice Growing States of India



- Wheat: This is the second most important cereal crop.
- It is the main food crop, in north and north-western part of the country.
- This rabi crop requires a cool growing season and a bright sunshine at the time of ripening.
- It requires 50 to 75 cm of annual rainfall evenly distributed over the growing season.
- There are two important wheat-growing zones in the country the Ganga-Satluj plains in the northwest and black soil region of the Deccan.
- The major wheat-producing states are Punjab, Haryana, Uttar Pradesh, Bihar, Rajasthan and parts of Madhya Pradesh.
- Millets: Jowar, bajra and ragi are the important millets grown in India.
- Though, these are known as coarse grains, they have very high nutritional value.
- For example, ragi is very rich in iron, calcium, other micro nutrients and roughage.
- Jowar is the third most important food crop with respect to area and production.
- It is a rain-fed crop mostly grown in the moist areas which hardly needs irrigation.
- Major Jowar producing States were Maharashtra, Karnataka, Andhra Pradesh and Madhya Pradesh in 2011-12.
- Bajra grows well on sandy soils and shallow black soil.

- Major Bajra producing States were: Rajasthan, Uttar Pradesh, Maharashtra, Gujarat and Haryana in 2011-12.
- Ragi is acrop of dry regions and grows well on red, black, sandy, loamy and shallow black soils.
- Major ragi producing states are: Karnataka, Tamil Nadu, Himachal Pradesh, Uttarakhand, Sikkim, Jharkhand and Arunachal Pradesh.
- Maize: It is a crop which is used both as food and fodder.
- It is a kharif crop which requires temperature between 21°C to 27°C and grows well in old alluvial soil.
- In some states like Biharmaize is grown in rabi season also.
- Use of modern inputs such as HYV seeds, fertilisers

and irrigation have contributed to the increasing production of maize.

- Major maize-producing states are Karnataka, Uttar Pradesh, Bihar, Andhra Pradesh, Telangana and Madhya Pradesh.
- Pulses: India is the largest producer as well as the consumer of pulses in the world.
- These are the major source of protein in a vegetarian diet.
- Major pulses that are grown in India are tur (arhar), urad, moong, masur, peas and gram.
- Pulses need less moisture and survive even in dry conditions.
- Being leguminous crops, all these crops except arhar help in restoring soil fertility by fixing nitrogen from the air.
- Therefore, these are mostly grown in rotation with other crops.
- Major pulse producing states in India are Madhya Pradesh, Uttar Pradesh, Rajasthan, Maharashtra and Karnataka.
- Food Crops other than Grains Sugarcane: It is a tropical as well as a subtropical crop.
- It grows well in hot and humid climate with a temperature of 21°C to 27°C and an annual rainfall between 75cm. and 100cm.
- Irrigation is required in the regions of low rainfall.
- It can be grown on a variety ofsoils and needs manual labour from sowing to harvesting.
- India is the second largest producer of sugarcane only after Brazil.



- **BrainyIAS**
- It is the main source of sugar, gur (jaggary), khandsari and molasses.
- The major sugarcane-producingstates are Uttar Pradesh, Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh, Telangana, Bihar, Punjab and Haryana.
- Oil Seeds: In 2008 India was the second largest producer of groundnut in the world after china.
- In rape seed production India was third largest producer in the world after Canada and China in 2008.
- Different oil seeds are grown covering approximately 12 per cent of the total cropped area of the country.
- Main oil-seeds produced in India are groundnut, mustard, coconut, sesamum (til), soyabean, castor seeds, cotton seeds, linseed and sunflower.
- Most of these are edible and used as cooking mediums.
- However, some of these are also used as raw material in the production of soap, cosmetics and ointments.
- Groundnut is a kharif crop and accounts for about half of the major oilseeds produced in the country.
- Gujarat was the largest producer of groundnut followed by Andhra Pradesh and Tamil Nadu in 2011-12.
- Linseed and mustard are rabi crops.
- Sesamum is a kharif crop in north and rabi crop in south India.
- Castor seed is grown both as rabi and kharif crop.
- Tea: Tea cultivation is an example of plantation agriculture.
- It is also an important beverage crop introduced in India initially by the British.
- Today, most of the tea plantations are owned by Indians.
- The tea plant grows well in tropical and sub-tropical climates endowed with deep and fertile well-drained soil, rich in humus and organic matter.
- Tea bushes require warm and moist frost-free climate all through the year.
- Frequent showers evenly distributed over the year ensure continuous growth of tender leaves.
- Tea is a labour intensive industry.
- It requires abundant, cheap and skilled labour.
- Tea is processed within the tea garden to restore its freshness.
- Major tea producing states are Assam, hills of Darjeeling and Jalpaiguri districts, West Bengal, Tamil Nadu and Kerala.
- Apart from these, Himachal Pradesh, Uttarakhand, Meghalaya, Andhra Pradesh and Tripura are also tea-producing states in the country.
- In 2008 India was the third largest producer of tea after China and Turkey.
- Coffee: In 2008 India produced 3.2 per cent of the world coffee production.
- Indian coffee is known in the world for its good quality.
- The Arabica variety initially brought from Yemen is produced in the country.
- This variety is in great demand all over the world.
- Intially its cultivation was introduced on the Baba Budan Hills and even today its cultivation is confined to the Nilgiri in Karnataka, Kerala and Tamil Nadu.

- BrainyIAS
- Horticulture Crops: In 2008 India was the second largest producer of fruits and vegetables in the world after China.
- India is a producer of tropical as well as temperate fruits.
- Mangoes of Maharashtra, Andhra Pradesh, Telangana, Uttar Pradesh and West Bengal, oranges of Nagpur and Cherrapunjee (Meghalaya), bananas of Kerala, Mizoram, Maharashtra and Tamil Nadu, lichi and guava of Uttar Pradesh and Bihar, pineapples of Meghalaya, grapes of Andhra Pradesh, Telangana and Maharashtra, apples, pears, apricots and walnuts of Jammu and Kashmir and Himachal Pradesh are in great demand the world over.
- India produces about 13 per cent of the world's vegetables.
- It is an important producer of pea, cauliflower, onion, cabbage, tomato, brinjal and potato.
- Non-Food Crops Rubber: It is an equatorial crop, but under special conditions, it is also grown in tropical and sub-tropical areas.
- It requires moist and humid climate with rainfall of more than 200 cm. and temperature above 25°C.
- Rubber is an important industrial raw material.
- It is mainly grown in Kerala, Tamil Nadu, Karnataka and Andaman and Nicobar Islands and Garo hills of Meghalaya.
- In 2010-11 India ranked fourth among the world's natural rubber producers.
- Fibre Crops: Cotton, jute, hemp and natural silk are the four major fibre crops grown in India.
- The first three are derived from the crops grown in the soil, the latter is obtained from cocoons of the silkworms fed on green leaves especially mulberry.
- Rearing of silk worms for the production of silk fibre is known as sericulture.
- Cotton: India is believed to be the original home of the cotton plant.
- Cotton is one of the main raw materials for cotton textile industry.
- In 2008 India was second largest producer of cotton after China.
- Cotton grows well in drier parts of the black cotton soil of the Deccan plateau.
- It requires high temperature, light rainfall or irrigation, 210 frost-free days and bright sun-shine for its growth.
- It is a kharif crop and requires 6 to 8 months to mature.
- Major cotton-producing states are— Maharashtra, Gujarat, Madhya Pradesh, Karnataka, Andhra Pradesh, Telangana, Tamil Nadu, Punjab, Haryana and Uttar Pradesh.
- Jute: It is known as the golden fibre which grows on well-drained fertile soils in the flood plains where soils are renewed every year.
- High temperature is required during the time of growth.
- West Bengal, Bihar, Assam, Odisha and Meghalaya are the major jute producing states.
- It is used in making gunny bags, mats, ropes, yarn, carpets and other artefacts.
- Due to its high cost, it is losing market to synthetic fibres and packing materials, particularly the nylon.
- **TECHNOLOGICAL AND INSTITUTIONAL REFORMS** It was mentioned in the previous pages that agriculture has been practised in India for thousands of years.
- Sustained uses of land without compatible techno-institutional changes have hindered the pace of agricultural development.

- Inspite of development of sources of irrigation most of the farmers in large parts of the country still depend upon monsoon and natural fertility in order to carry on their agriculture.
- For a growing population, this poses a serious challenge.
- Agriculture which provides livelihood for more than 60 per cent of its population, needs some serious technical and institutional reforms.
- Thus, collectivisation, consolidation of holdings, cooperation and abolition of zamindari, etc. were given priority to bring about institutional reforms in the country after Independence.
- 'Land reform' was the main focus of our First Five Year Plan.
- The right of inheritance had already lead to fragmentation of land holdings necessitating consolidation of holdings.
- The laws of land reforms were enacted but the laws of implementation was lacking or lukewarm.
- The Government of India embarked upon introducing agricultural reforms to improve Indian agriculture in the 1960s and 1970s.
- The Green Revolution based on the use of package technology and the White Revolution (Operation Flood) were some of the strategies initiated to improve the lot of Indian agriculture.
- But, this too led to the concentration of development in few selected areas.
- Therefore, in the 1980s and 1990s, a comprehensive land development programme was initiated, which included both institutional and technical reforms.
- Provision for crop insurance against drought, flood, cyclone, fire and disease, establishment of Grameen banks, cooperative societies and banks for providing loan facilities to the farmers at lower rates of interest were some important steps in this direction.
- Kisan Credit Card (KCC), Personal Accident Insurance Scheme (PAIS) are some other schemes introduced by the Government of India for the benefit of the farmers.
- Moreover, special weather bulletins and agricultural programmes for farmers were introduced on the radio and television.
- The government also announces minimum support price, remunerative and procurement prices for important crops to check the exploitation of farmers by speculators and middlemen.
- CONTRIBUTION OF AGRICULTURE TO THE NATIONAL ECONOMY, EMPLOYMENT AND OUTPUT Agriculture has been the backbone of the Indian economy though its share in the Gross Domestic Product (GDP) has registered a declining trend from 1951 onwards; in 2010-11 about 52 per cent of the total work force was employed by the farm sector which makes more than half of the Indian Population dependent on agriculture for sustenance.
- The declining share of agriculture in the GDP is a matter of serious concern because any decline and stagnation in agriculture will lead to a decline in other spheres of the economy having wider implications for society.
- Considering the importance of agriculture in India, the Government of India made concerted efforts to modernise agriculture.
- Establishment of Indian Council of Agricultural Research (ICAR), agricultural universities, veterinary services and animal breeding centres, horticulture development, research and development in the field of meteorology and weather forecast, etc. were given priority for improving Indian agriculture.
- Apart from this, improving the rural infrastructure was also considered essential for the same.

- Though the GDP growth rate is increasing over the years, it is not generating sufficient employment opportunities in the country.
- The growth rate in agriculture is decelerating which is an alarming situation.
- Today, Indian farmers are facing a big challenge from international competition and our government is going ahead with reduction in the public investment in agriculture sector particularly in irrigation, power, rural roads, market and mechanisation.
- Subsidy on fertilisers is decreased leading to increase in the cost of production.
- Moreover, reduction in import duties on agricultural products have proved detrimental to agriculture in the country.
- Farmers are withdrawing their investment from agriculture causing a downfall in the employment in agriculture.
- **FOOD SECURITY** Food is a basic need and every citizen of the country should have access to food which provides minimum nutritional level.
- If any segment of our population does not have this access, that segment suffers from lack of food security.
- The number of people who do not have food security is disproportionately large in some regions of our country, particularly in economically less developed states with higher incidence of poverty.
- The remote areas of the country are more prone to natural disasters and uncertain food supply.
- In order to ensure availability of food to all sections of society our government carefully designed a national food security system.
- It consists of two components (a) buffer stock and (b) public distribution system (PDS).
- PDS is a programme which provides food grains and other essential commodities at subsidised prices in rural and urban areas.
- India's food security policy has a primary objective to ensure availability of food grains to the common people at an affordable price.
- It has enabled the poor to have access to food.
- The focus of the policy is on growth in agriculture production and on fixing the support price for procurement of wheat and rice, to maintain their stocks.
- Food Corporation of India (FCI) is responsible for procuring and stocking food grains, whereas distribution is ensured by public distribution system (PDS).
- The FCI procures food grains from the farmers at the government announced minimum support price (MSP).



• The government used to provide subsidies on agriculture inputs such as fertilizers, power and water.

- These subsidies have now reached unsustainable levels and have also led to large scale inefficiencies in the use of these scarce inputs.
- Excessive and imprudent use of fertilizers and water has led to waterlogging, salinity and depletion of essential micronutrients in the soil.
- The high MSP, subsidies in input and committed FCI purchases have distorted the cropping pattern.
- Wheat and paddy crops are being grown more for the MSP they get. Punjab and Haryana are foremost examples.
- This has also created a serious imbalance in inter-crop parities.
- Consumers are divided into two categories: below poverty line (BPL) and above poverty line (APL), with the issue price being different for each category.
- However, this categorisation is not perfect and a number of deserving poor have been excluded from the BPL category.
- Moreover, some of the so called APL slip back to BPL, because of the failure of even one crop and it is administratively difficult to accommodate such shifts.
- Each district and block can be made self-sufficient in food grain production if government provides proper agricultural infrastructure, credit linkages and also encourages the use of latest techniques.
- Instead of concentrating only on rice or wheat, the food crop with a better growth potential in that particular area must be encouraged.
- Creation of necessary infrastructure like irrigation facilities, availability of electricity etc. may also attract private investments in agriculture.



MINERALS AND ENERGY RESOURCES

- The earth's crust is made up of different minerals embedded in the rocks.
- Various metals are extracted from these minerals after proper refinement.
- Minerals are an indispensable part of our lives.
- Almost everything we use, from a tiny pin to a towering building or a big ship, all are made from minerals.
- The railway lines and the tarmac (paving) of the roads, our implements and machinery too are made from minerals.
- Cars, buses, trains, airplanes are manufactured from minerals and run on power resources derived from the earth.
- Even the food that we eat contains minerals.
- In all stages of development, human beings have used minerals for their livelihood, decoration, festivities, religious and ceremonial rites.
- Minerals: Geologists define mineral as a "homogenous, naturally occurring substance with a definable internal structure." Minerals are found in varied forms in nature, ranging from the hardest diamond to the softest talc.
- Rocks are combinations of homogenous substances called minerals.
- Some rocks, for instance limestone, consist of a single mineral only, but majority of the rock consist of several minerals in varying proportions.
- Although, over 2000 minerals have been identified, only a few are abundantly found in most of the rocks.
- A particular mineral that will be formed from a certain combination of elements depends upon the physical and chemical conditions under which the material forms.
- This, in turn, results in a wide range of colours, hardness, crystal forms, lustre and density that a particular mineral possesses.
- Geologists use these properties to classify the minerals.
- MODE OF OCCURRENCE OF MINERALS Minerals are usually found in "ores".
- The term ore is used to describe an accumulation of any mineral mixed with other elements.
- The mineral content of the ore must be in sufficient concentration to make its extraction commercially viable.
- The type of formation or structure in which they are found determines the relative ease with which mineral ores may be mined.
- This also determines the cost of extraction.
- It is, therefore, important for us to understand the main types of formations in which minerals occur.
- Minerals generally occur in these forms: (i) In igneous and metamorphic rocks minerals may occur in the cracks, crevices, faults or joints.
- The smaller occurrences are called veins and the larger are called lodes.

- In most cases, they are formed when minerals in liquid/ molten and gaseous forms are forced upward through cavities towards the earth's surface.
- They cool and solidify as they rise.
- Major metallic minerals like tin, copper, zinc and lead etc. are obtained from veins and lodes.
- (ii) In sedimentary rocks a number of minerals occur in beds or layers.
- They have been formed as a result of deposition, accumulation and concentration in horizontal strata.
- Coal and some forms of iron ore have been concentrated as a result of long periods under great heat and pressure.
- Another group of sedimentary minerals include gypsum, potash salt and sodium salt.
- These are formed as a result of evaporation especially in arid regions.
- Another mode of formation involves the decomposition of surface rocks, and the removal of soluble constituents, leaving a residual mass of weathered material containing ores.
- Bauxite is formed this way.
- Certain minerals may occur as alluvial deposits in sands of valley floors and the base of hills.
- These deposits are called 'placer deposits' and

generally contain minerals, which are not corroded by water.

Iron, cobalt,

Nickel etc.

- Gold, silver, tin and platinum are most important among such minerals.
- The ocean waters contain vast quantities of minerals, but most of these are too widely diffused to be of economic significance.
- However, common salt, magnesium and bromine are largely derived from ocean waters.
- The ocean beds, too, are rich in manganese nodules.
- India is fortunate to have fairly rich and varied mineral resources.
- However, these are unevenly distributed.
- Broadly speaking, peninsular rocks contain most of the reserves of coal, metallic minerals, mica and many other non-metallic minerals.
- Sedimentary rocks on the western and eastern flanks of the peninsula, in Gujarat and Assam have most of the petroleum deposits.
- Rajasthan with the rock systems of the peninsula, has reserves of many non-ferrous minerals.

Classification Of Mineral resources Minerals Metallic Non-Metallic Energy Ferrous Non-Ferrous Precious Mica, Potash, Sulphur salts etc. Coal and Fossil fuels

Copper, lead,

Tin, bauxite

etc.

Silver, gold,

Platinum etc.

BrainyIAS

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- The vast alluvial plains of north India are almost devoid of economic minerals.
- These variations exist largely because of the differences in the geological structure, processes and time involved in the formation of minerals.
- The concentration of mineral in the ore, the ease of extraction and closeness to the market play an important role in affecting the economic viability of a reserve.

- Thus, to meet the demand, a choice has to be made between a number of possible options.
- When this is done a mineral 'deposit' or 'reserve' turns into a mine.
- **FERROUS MINERALS** Ferrous minerals account for about three fourths of the total value of the production of metallic minerals.
- They provide a strong base for the development of metallurgical industries.
- India exports substantial quantities of ferrous minerals after meeting her internal demands.
- Iron Ore Iron ore is the basic mineral and the backbone of industrial development.
- India is endowed with fairly abundant resources of iron ore.
- India is rich in good quality iron ores.
- Magnetite is the finest iron ore with a very high content of iron up to 70 per cent.
- It has excellent magnetic qualities, especially valuable in the electrical industry.
- Hematite ore is the most important industrial iron ore in terms of the quantity used, but has a slightly lower iron content than magnetite.
- (50-60 per cent).
- The major iron ore belts in India are: Odisha-Jharkhand belt: In Odisha high grade hematite ore is found in Badampahar mines in the Mayurbhanj and Kendujhar districts.
- In the adjoining Singbhum district of Jharkhand haematite iron ore is mined in Gua and Noamundi.
- Durg-Bastar-Chandrapur belt lies in Chhattisgarh and Maharashtra.
- Very high grade hematites are found in the famous Bailadila range of hills in the Bastar district of Chhattisgarh.
- The range of hills comprise of 14 deposits of super high grade hematite iron ore.
- It has the best physical properties needed for steel making.
- Iron ore from these mines is exported to Japan and South Korea via Vishakhapatnam port.
- Ballari-Chitradurga-Chikkamagaluru- Tumakuru belt in Karnataka has large reserves of iron ore.
- The Kudremukh mines located in the Western Ghats of Karnataka are a 100 per cent export unit.
- Kudremukh deposits are known to be one of the largest in the world.
- The ore is transported as slurry through a pipeline to a port near Mangaluru.
- Maharashtra-Goa belt includes the state of Goa and Ratnagiri district of Maharashtra.
- Though, the ores are not of very high quality, yet they are efficiently exploited.
- Iron ore is exported through Marmagao port.
- Manganese Manganese is mainly used in the manufacturing of steel and ferro-manganese alloy.
- Nearly 10 kg of manganese is required to manufacture one tonne of steel.
- It is also used in manufacturing bleaching powder, insecticides and paints.
- Odisha is the largest producer of manganese ores in India.
- 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 India is critically deficient in the reserve and production of copper.
- Being malleable, ductile and a good conductor, copper is mainly used in electrical cables, electronics and chemical industries.
- The Balaghat mines in Madhya Pradesh, Khetri mines in Rajasthan and Singhbhum district of Jharkhand are leading producers of copper.
- Bauxite Though, several ores contain aluminium, it is from bauxite, a clay-like substance that alumina and later aluminium is obtained.
- Bauxite deposits are formed by the decomposition of a wide variety of rocks rich in aluminium silicates.
- Aluminium is an important metal because it combines the strength of metals such as iron, with extreme lightness and also with good conductivity and great malleability.
- India's bauxite deposits are mainly found in the Amarkantak plateau, Maikal hills and the plateau region of Bilaspur-Katni.
- Odisha was the largest bauxite producing state in India with 34.97 per cent of the country's total production in 2009-10.
- Panchpatmali deposits in Koraput district are the most important bauxite deposits in the state.
- NON-METALLIC MINERALS Mica is a mineral made up of a series of plates or leaves.
- It splits easily into thin sheets.
- These sheets can be so thin that a thousand can be layered into a mica sheet of a few centimeters high.
- Mica can be clear, black, green, red yellow or brown.
- 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.
- Mica deposits are found in the northern edge of the Chota Nagpur plateau.
- Koderma Gaya Hazaribagh belt of Jharkhand is the leading producer.
- 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 Limestone is found in association with rocks composed of calcium carbonates or calcium and magnesium carbonates.
- It is found in sedimentary rocks of most geological formations.
- Limestone is the basic raw material for the cement industry and essential for smelting iron ore in the blast furnace.
- Stricter safety regulations and implementation of environmental laws are essential to prevent mining from becoming a "killer industry".
- **CONSERVATION OF MINERALS** We all appreciate the strong dependence of industry and agriculture upon mineral deposits and the substances manufactured from them.
- The total volume of workable mineral deposits is an insignificant fraction i.e. one per cent of the earth's crust.

- We are rapidly consuming mineral resources that required millions of years to be created and concentrated.
- The geological processes of mineral formation are so slow that the rates of replenishment are infinitely small in comparison to the present rates of consumption.
- Mineral resources are, therefore, finite and non-renewable.
- Rich mineral deposits are our country's extremely valuable but short-lived possessions.
- Continued extraction of ores leads to increasing costs as mineral extraction comes from greater depths along with decrease in quality.
- A concerted effort has to be made in order to use our mineral resources in a planned and sustainable manner.
- Improved technologies need to be constantly evolved to allow use of low grade ores at low costs.



- Recycling of metals, using scrap metals and other substitutes are steps in conserving our mineral resources for the future.
- **ENERGY RESOURCES** Energy is required for all activities.
- It is needed to cook, to provide light and heat, to propel vehicles and to drive machinery in industries.
- Energy can be generated from fuel minerals like coal, petroleum, natural gas, uranium and from electricity.
- Energy resources can be classified as conventional and nonconventional sources.
- Conventional sources include: firewood, cattle dung cake, coal, petroleum, natural gas and electricity (both hydel and thermal).
- Non-conventional sources include solar, wind, tidal, geothermal, biogas and atomic energy.
- 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; continuation of these is increasingly becoming difficult due to decreasing forest area.
- Moreover, using dung cake too is being discouraged because it consumes most valuable manure which could be used in agriculture.
- Conventional Sources of Energy 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, to supply energy to industry as well as for domestic needs.
- India is highly dependent on coal for meeting its commercial energy requirements.

- **BrainyIAS**
- Coal is formed due the compression of plant material over millions of years therefore, is found in a variety of forms depending on the degrees of compression and the depth and time of burial.
- Decaying plants in swamps produce peat which has a low carbon and high moisture contents and low heating capacity.
- Lignite is a low grade brown coal, which is soft with high moisture content.
- The principal lignite reserves are in Neyveli in Tamil Nadu and are used for generation of electricity.
- Coal that has been buried deep and subjected to increased temperatures is bituminous coal. It is the most popular coal in commercial use.
- Metallurgical coal is high grade bituminous coal which has a special value for smelting iron in blast furnaces.
- Anthracite is the highest quality hard coal.
- 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.
- The major resources of Gondwana coal, which are metallurgical coal, are located inDamodar valley (West Bengal-Jharkhand).
- Jharia, Raniganj, Bokaro are important coalfields.
- The Godavari, Mahanadi, Son and Wardha valleys also contain coal deposits.
- Tertiary coals occur in the north eastern states of Meghalaya, Assam, Arunachal Pradesh and Nagaland.
- Remember coal is a bulky material, which loses weight on use as it is reduced to ash.
- Hence, heavy industries and thermal power stations are located on or near the coalfields.
- Petroleum Petroleum or mineral oil is the next major energy source in India after coal.
- It provides fuel for heat and lighting, lubricants for machinery and raw materials for a number of manufacturing industries.
- Petroleum refineries act as a "nodal industry" for synthetic textile, fertiliser and numerous chemical industries.
- Most of the petroleum occurrences in India are associated with anticlines and fault traps in the rock formations of the tertiary age.
- In regions of folding, anticlines or domes, it occurs where oil is trapped in the crest of the upfold.
- The oil bearing layer is a porous limestone or sandstone through which oil may flow.
- The oil is prevented from rising or sinking by intervening non-porous layers.
- Petroleum is also found in fault traps between porous and non-porous rocks.
- Gas, being lighter usually occurs above the oil.
- About 63 per cent of India's petroleum production is from Mumbai High, 18 per cent from Gujarat and 16 per cent from Assam.
- From the map locate the 3 major off shore fields of western India.
- Ankeleshwar is the most important field of Gujarat.
- Assam is the oldest oil producing state of India.
- Digboi, Naharkatiya and Moran-Hugrijan are the important oil fields in the state.

- Natural Gas Natural gas is an important clean energy resource found in association with or without petroleum.
- It is used as a source of energy as well as an industrial raw material in the petrochemical industry.
- Natural gas is considered an environment friendly fuel because of low carbon dioxide emissions and is, therefore, the fuel for the present century.
- Large reserves of natural gas have been discovered in the Krishna- Godavari basin.
- Along the west coast the reserves of the Mumbai High and allied fields are supplemented by finds in the Gulf of Cambay.
- Andaman and Nicobar islands are also important areas having large reserves of natural gas.
- The 1700 km long Hazira-Vijaipur Jagdishpur cross country gas pipeline links Mumbai High and Bassien with the fertilizer, power and industrial complexes in western and northern India.
- This artery has provided an impetus to India's gas production.
- The power and fertilizer industries are the key users of natural gas.
- Use of Compressed Natural Gas (CNG) for vehicles to replace liquid fuels is gaining wide popularity in the country.
- Electricity Electricity has such a wide range of applications in today's world that, its per capita consumption is considered as an index of development.
- Electricity is generated mainly in two ways: by running water which drives hydro turbines to generate hydroelectricity; and by burning other fuels such as coal, petroleum and natural gas to drive turbines to produce thermal power.
- Once generated the electricity is exactly the same.
- Hydro electricity is generated by fast flowing water, which is a renewable resource.
- India has a number of multi-purpose projects like the Bhakra Nangal, Damodar Valley Corporation, the Kopili Hydel Project etc. producing hydroelectric power.
- Thermal electricity is generated by using coal, petroleum and natural gas.
- The thermal power stations use non-renewable fossil fuels for generating electricity.
- There are over 310 thermal power plants in India.
- NON-CONVENTIONAL SOURCES OF ENERGY The growing consumption of energy has resulted in the country becoming increasingly dependent on fossil fuels such as coal, oil and gas.
- Rising prices of oil and gas and their potential shortages have raised uncertainties about the security of energy supply in future, which in turn has serious repercussions on the growth of the national economy.
- Moreover, increasing use of fossil fuels also causes serious environmental problems.
- Hence, there is a pressing need to use renewable energy sources like solar energy, wind, tide, biomass and energy from waste



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material.

- These are called nonconventional energy sources.
- India is blessed with an abundance of sunlight, water, wind and biomass.
- It has the largest number of programmes for the development of these renewable energy resources.
- NUCLEAR OR ATOMIC ENERGY It is obtained by altering the structure of atoms.
- When such an alteration is made, much energy is released in the form of heat and this is used to generate electric power.
- Uranium and Thorium, which are available in Jharkhand and the Aravalli ranges of Rajasthan are used for generating atomic or nuclear power.
- The Monazite sands of Kerala is also rich in Thorium.
- Solar Energy India is a tropical country.
- It has enormous possibilities of tapping solar energy.
- Photovoltaic technology converts sunlight directly into electricity.
- Solar energy is fast becoming popular in rural and remote areas.
- Some big solar power plants are being established in different parts of India which will minimise the dependence of rural households on firewood and dung cakes, which in turn will contribute to environmental conservation and adequate supply of manure in agriculture.
- Wind power India has great potential of wind power.
- The largest wind farm cluster is located in Tamil Nadu from Nagarcoil to Madurai.
- Apart from these, Andhra



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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 Shrubs, farm waste, animal and human waste are used to produce biogas for domestic consumption in rural areas.
- Decomposition of organic matter yields gas, which has higher thermal efficiency in comparison to kerosene, dung cake and charcoal.
- Biogas plants are set up at municipal, cooperative and individual levels.
- The plants using cattle dung are known as 'Gobar gas plants' in rural India.
- These provide twin benefits to the farmer in the form of energy and improved quality of manure.
- Biogas is by far the most efficient use of cattle dung.
- It improves the quality of manure and also prevents the loss of trees and manure due to burning of fuel wood and cow dung cakes.
- Tidal Energy Oceanic tides can be used to generate electricity.
- Floodgate dams are built across inlets.
- During high tide water flows into the inlet and gets trapped when the gate is closed.
- 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.
- In India the Gulf of Khambhat, the Gulf of Kuchchh in Gujarat on the western coast and Gangetic delta in Sunderban regions of West Bengal provide ideal conditions for utilising tidal energy.
- Geo Thermal Energy Geo thermal energy refers to the heat and electricity produced by using the heat from the interior of the Earth.
- Geothermal energy exists because, the Earth grows progressively hotter with increasing depth.
- Where the geothermal gradient is high, high temperatures are found at shallow depths.
- Groundwater in such areas absorbs heat from the rocks and becomes hot.
- It is so hot that when it rises to the earth's surface, it turns into steam.
- This steam is used to drive turbines and generate electricity.
- There are several hundred hot springs in India, which could be used to generate electricity.
- Two experimental projects have been set up in India to harness geothermal energy.
- One is located in the Parvati valley near Manikarn in Himachal Pradesh and the other is located in the Puga Valley, Ladakh.



MANUFACTURING INDUSTRIES

- Production of goods in large quantities after processing from raw materials to more valuable products is called manufacturing.
- People employed in the secondary activities manufacture the primary materials into finished goods.
- The workers employed in steel factories, car, breweries, textile industries, bakeries etc. fall into this category while some people are employed in providing services.
- IMPORTANCE OF MANUFACTURING Manufacturing sector is considered the backbone of development in general and economic development in particular mainly because manufacturing industries not only help in modernising agriculture, which forms the backbone of our economy, they also reduce the heavy dependence of people on agricultural income by providing them jobs in secondary and tertiary sectors.
- Industrial development is a precondition for eradication of unemployment and poverty from our country.
- This was the main philosophy behind public sector industries and joint sector ventures in India.
- It was also aimed at bringing down regional disparities by establishing industries in tribal and backward areas.
- Export of manufactured goods expands trade and commerce, and brings in much needed foreign exchange.
- Countries that transform their raw materials into a wide variety of furnished goods of higher value are prosperous.
- India's prosperity lies in increasing and diversifying its manufacturing industries as quickly as possible.
- Agriculture and industry are not exclusive of each other.
- They move hand in hand.
- For instance, the agro-industries in India have given a major boost to agriculture by raising its productivity.
- They depend on the latter for raw materials and sell their products such as irrigation pumps, fertilisers, insecticides, pesticides, plastic and PVC pipes, machines and tools, etc.to the farmers.
- Thus, development and competitiveness of manufacturing industry has not only assisted agriculturists in increasing their production but also made the production processes very efficient.
- In the present day world of globalisation, our industry needs to be more efficient and competitive.
- Self-sufficiency alone is not enough.
- Our manufactured goods must be at par in quality with those in the international market.
- Only then, will we be able to compete in the international market.
- Contribution of Industry to National Economy Over the last two decades, the share of manufacturing sector has stagnated at 17 per cent of GDP out of a total of 27 per cent for the industry which includes 10 per cent for mining, quarrying, electricity and gas.
- This is much lower in comparison to some East Asian economies, 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.

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- The desired growth rate over the next decade is 12 per cent.
- Since 2003, manufacturing is once again growing at the rate of 9 to 10 per cent per annum.
- With appropriate policy interventions by the government and renewed efforts by the industry to improve productivity, economists predict that manufacturing can achieve its target over the next decade.
- The National Manufacturing Competitiveness Council (NMCC) has been set up with this objective.
- INDUSTRIAL LOCATION Industrial locations are complex in nature.
- These are influenced by availability of raw material, labour, capital, power and market, etc.
- It is rarely possible to find all these factors available at one place.
- Consequently, manufacturing activity tends to locate at the most appropriate place where all the factors of industrial location are either available or can be arranged at lower cost.
- After an industrial activity starts, urbanisation follows.
- Sometimes, industries are located in or near the cities.
- Thus, industrialisation and urbanisation go hand in hand.
- Cities provide markets and also provide services such as banking, insurance, transport, labour, consultants and financial advice, etc. to the industry.
- Many industries tend to come together to make use of the advantages offered by the urban centres known as agglomeration economies.
- Gradually, a large industrial agglomeration takes place.
- In the pre-Independence period, most manufacturing units were located in places from the point of view of overseas trade such as Mumbai, Kolkata, Chennai, etc.
- Consequently, there emerged certain pockets of industrially developed urban centres surrounded by a huge agricultural rural hinterland.
- The key to decision of the factory location is the least cost.
- Government policies and specialised labour also influence the location of industry.
- Agro Based Industries
 Cotton, jute, silk,

Locational factors for industries

woollen textiles, sugar and edible oil, etc. industries are based on agricultural raw materials.

• Textile Industry: The textile industry occupies unique position in the Indian economy, because it contributes significantly to industrial production (14 per cent), employment generation (35



million persons directly – the second largest after agriculture) and foreign exchange earnings (about 24.6 per cent).

- It contributes 4 per cent towards GDP.
- It is the only industry in the country, which is self-reliant and complete in the value chain i.e., from raw material to the highest value added products.
- Cotton Textiles: In ancient India, cotton textiles were produced with hand spinning and handloom weaving techniques.
- 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.
- As on 30 November 2011, there were 1946 cotton and human-made fibre textile milk in the country.
- About 80 per cent of these are in the private sector and the rest in the public and cooperative sectors.
- Apart from these, there are several thousand small factories with four to ten looms.
- In the early years, the cotton textile industry was concentrated in the cotton growing belt of Maharashtra and Gujarat.
- Availability of raw cotton, market, transport including accessible port facilities, labour, moist climate, etc. contributed towards its localisation.



- This industry has close links with agriculture and provides a living to farmers, cotton boll pluckers and workers engaged in ginning, spinning, weaving, dyeing, designing, packaging, tailoring and sewing.
- The industry by creating demands supports many other industries, such as, chemicals and dyes, mill stores, packaging materials and engineering works.

 While spinning continues to be centralised in Maharashtra, Gujarat and Tamil Nadu, weaving is highly decentralised to provide scope for incorporating traditional skills and designs of weaving in cotton, silk, zari, embroidery, etc.

- 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.
- Weaving is done by handloom, power loom and in mills.
- The handspun khadi provides large scale employment to weavers in their homes as a cottage industry.
- 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.
- India has the second largest installed capacity of spindles in the world, with 43.13 million spindles (2011-12) after China.
- Since the mid-eighties, the spinning sector has received a lot of attention.
- We have a large share in the world trade of cotton yarn, accounting for one fourth of the total trade.
- However, our trade in garments is only 4 per cent of the world's total.
- Our spinning mills are competitive at the global level and capable of using all the fibres we produce.
- The weaving, knitting and processing units cannot use much of the high quality yarn that is produced in the country.
- There are some large and modern factories in these segments, but most of the production is in fragmented small units, which cater to the local market.
- This mismatch is a major drawback for the industry.
- As a result, many of our spinners export cotton yarn while apparel/garment manufactures have to import fabric.
- Although, we have made significant increase in the production of good quality long staple cotton (356 lakh bales of 170 kgs each during 2011-12), the need to import is still felt.
- Power supply is erratic and machinery needs to be upgraded in the weaving and processing sectors in particular.
- Other problems are the low output of labour and stiff competition with the synthetic fibre industry.
- Jute Textiles India is the largest producer of raw jute and jute goods and stands at second place as an exporter after Bangladesh.
- There were about 80 jute mills in India in 2010-11.
- 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).
- 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, 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.
- Kolkata as a large urban centre provides banking, insurance and port facilities for export of jute goods.

- In 2010-11 the jute industry was supporting 3.7 lakh workers directly and another 40 lakhs small and marginal
 - farmers who were engaged in cultivation of jute and mesta.
- Many more people were associated indirectly.
- 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.
- However, the internal demand has been on the increase due to the Government policy of mandatory use of jute packaging.



- To stimulate demand, the products need to be diversified.
- In 2005, National Jute Policy was formulated with the objective of increasing productivity, improving quality, ensuring good prices to the jute farmers and enhancing the yield per hectare.
- The main markets are U.S.A., Canada, Russia, United Arab Republic, U.K. and Australia.
- The growing global concern for environment friendly, biodegradable materials, has once again opened the opportunity for jute products.
- Sugar Industry India stands second as a world producer of sugar but occupies the first place in the production of gur and khandsari.
- The raw material used in this industry is bulky, and in haulage its sucrose content reduces.
- In 2010-11 there were over 662 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.
- Sixty per cent mills are in Uttar Pradesh and Bihar.
- This industry is seasonal in nature so, it is ideally suited to the cooperative sector.
- In recent years, there is a tendency for the mills to shift and concentrate in the southern and western states, especially in Maharashtra, This is because the cane produced here has a higher sucrose content.
- The cooler climate also ensures a longer crushing season.
- Moreover, the cooperatives are more successful in these states.

Major challenges include the seasonal nature of the industry, old and inefficient methods of
production, transport delay in reaching cane to factories and the need to maximise the use of
bagasse.

- Mineral based Industries Industries that use minerals and metals as raw materials are called mineral based industries.
- Iron and Steel Industry The iron and steel Industry is the basic industry since all the other industries heavy, medium and light, depend on it for their machinery.
- Steel is needed to manufacture a variety of engineering goods, construction material, defence, medical, telephonic, scientific equipment and a variety of consumer goods.
- Production and consumption of steel is often regarded as the index of a country's development.
- 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.
- Iron ore, coking coal and lime stone are required in the ratio of approximately 4: 2 : 1.
- Some quantities of manganese, are also required to harden the steel.
- Finished products also need an efficient transport network for their distribution to the markets and consumers.
- In 2010-11 with 72.2 million tonnes of steel production, India ranked 4th among the world crude steel producers.
- It is the largest producer of sponge iron.
- In 2010-11 per capita cosumption of steel in the country was only around 49 kg per annum against the world average of 182 kg.
- Most of the public sector undertakings market their steel through Steel Authority of India Ltd (SAIL).
- In the 1950s China and India produced almost the same quantity of steel.
- Today, China is the largest producer of steel.
- China is also the world's largest consumer of steel.
- In 2004, India was the largest exporter of steel which accounted for 2.25 per cent of the global steel trade.
- Chotanagpur plateau region has the maximum concentration of iron and steel industries.
- It is largely, because of the relative advantages this region has for the development of this industry.
- These include, low cost of iron ore, high grade raw materials in proximity, cheap labour and vast growth potential in the home market.
- 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: (a) High costs and limited availability of coking coal (b) Lower productivity of labour (c) Irregular supply of energy and (d) Poor infrastructure.
- We also import good quality steel from other countries.
- However, the overall production of steel is sufficient to meet our domestic demand.
- Liberalisation and Foreign Direct Investment have given a boost to the industry with the efforts of private entrepreneurs.
- There is a need to allocate resources for research and development to produce steel more computatitively.

• Aluminium Smelting Aluminium smelting is the second most important metallurgical industry in India.

- It is light, resistant to corrosion, a good conductor of heat, malleable and becomes strong when it is mixed with other metals.
- It is used to manufacture aircraft, utensils and wires.
- It has gained popularity as a substitute of steel, copper, zinc and lead in a number of industries.
- Aluminium smelting plants in the country are located in Odisha, West Bengal, Kerala, Uttar Pradesh, Chhattisgarh, Maharashtra and Tamil Nadu.
- In 2008-09 India produced over 15.29 lakh million tonnes of aluminium.
- Bauxite, the raw material used in the smelters is a very bulky, dark reddish coloured rock.
- The flow chart given below shows the process of manufacturing aluminium.
- 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 The chemical industry in India is fast growing and diversifying.
- It contributes approximately 3 per cent of the GDP.
- It is the third largest in Asia and occupies the twelfth place in the world in term of its size.
- It comprises both large and small scale manufacturing units.
- Rapid growth has been recorded in both inorganic and organic sectors.
- 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.
- These industries are widely spread over the country.
- Organic chemicals include petrochemicals, which are used for manufacturing of synthetic fibers, synthetic rubber, plastics, dye-stuffs, drugs and pharmaceuticals.
- Organic chemical plants are located near oil refineries or petrochemical plants.
- The chemical industry is its own largest consumer.
- Basic chemicals undergo processing to further produce other chemicals that are used for industrial application, agriculture or directly for consumer markets.
- Fertiliser Industry The fertiliser industry is centered around the



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production of nitrogenous fertilisers (mainly urea), phosphate fertilisers and ammonium phosphate (DAP) and complex fertilisers which have a combination of nitrogen (N), phosphate (P), and potash (K).

- The third, i.e. potash is entirely imported as the country does not have any reserves of commercially usable potash or potassium compounds in any form.
- India is the third largest producer of nitrogenous fertilisers.
- There are 57 fertiliser units manufacturing nitrogenous and complex nitrogenous fertilisers, 29 for urea and 9 for producing ammonium sulphate as a byproduct and 68 other small units produce single superphosphate.
- At present, there are 10 public sector undertakings and one in cooperative sector at Hazira in Gujarat under the Fertiliser Corporation of India.
- After the Green Revolution the industry expanded to several other parts of the country.
- Gujarat, Tamil Nadu, Uttar Pradesh, Punjab and Kerala contribute towards half the fertiliser production.
- Other significant producers are Andhra Pradesh, Odisha, Rajasthan, Bihar, Maharashtra, Assam, West Bengal, Goa, Delhi, Madhya Pradesh and Karnataka.
- Cement Industry Cement is essential for construction activity such as building houses, factories, bridges, roads, airports, dams and for other commercial establishments.
- This industry requires bulky and heavy raw materials like limestone, silica, alumina and gypsum.
- Coal and electric power are needed apart from rail transportation.
- The industry has strategically located plants in Gujarat that have suitable access to the market in the Gulf countries.
- The first cement plant was set up in Chennai in 1904. After Independence the industry expanded.
- Decontrol of price and distribution since 1989 and other policy reforms led the cement industry to make rapid strides in capacity, process, technology and production.
- There are 128 large plants and 332 mini cement plants in the country.
- India produces a variety of cement. 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.
- This industry is doing well in terms of production as well as export.
- Efforts are being made to generate adequate domestic demand and supply in order to sustain this industry.
- Automobile Industry Automobiles provide vehicle for quick transport of good services and passengers.
- Trucks, buses, cars, motor cycles, scooters, three-wheelers and multi-utility vehicles are manufactured in India at various centres.
- After the liberalisation, the coming in of new and contemporary models stimulated the demand for vehicles in the market, which led to the healthy growth of the industry including passenger cars, two and three wheelers.
- This industry had experienced a quantum jump in less than 15 years.
- Foreign Direct Investment brought in new technology and aligned the industry with global developments.

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- At present, there are 15 manufacturers of passenger cars and multi utility vehicles, 9 of commercial vehicles, 14 of the two and three-wheelers.
- The industry is located around Delhi, Gurgaon, Mumbai, Pune, Chennai, Kolkata, Lucknow, Indore, Hyderabad, Jamshedpur and Bengaluru.
- Information Technology and Electronics Industry 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 equipments required by the telecommunication industry.
- Bangalore has emerged as the electronic capital of India.
- Other important centres for electronic goods are Mumbai, Delhi, Hyderabad, Pune, Chennai, Kolkata, Lucknow and Coimbatore.
- By 2010-11 (STPI) Software Technology Parks of India have come up across 46 locations at different centres of India.
- However, the major industry concentration is at Bangalore, Noida, Mumbai, Chennai, Hyderabad and Pune.
- A major impact of this industry has been on employment generation.
- It is encouraging to know that 30 per cent of the people employed in this sector are women.
- 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.
- The continuing growth in the hardware and software is the key to the success of IT industry in India.



LIFELINES OF NATIONAL ECONOMY

- **ROADWAYS** India has one of the largest road networks in the world, aggregating to about 2.3 million km at present.
- In India, roadways have preceded railways.
- They still have an edge over railways in view of the ease with which they can be built and maintained.

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provides door-to-door service, thus the cost of loading and unloading is much lower, (f) road transport is also used as a feeder to other modes of transport such as they provide a link between railway stations, air and sea ports.

- Roads can also be classified on the basis of the type of material used for their construction such as metalled and unmetalled roads.
- Metalled roads may be made of cement, concrete or even bitumen of coal, therefore, these are all weather roads.
- Unmetalled roads go out of use in the rainy season.
- Road Density The length of road per 100 sq.km of area is known as density of roads.
- Distribution of road is not uniform in the country.
- Density of all roads varies from only 12.14 km in Jammu and Kashmir to 517.77 km in Kerala (as on 31 March 2011) with the national average of 142.68 km (31 March 2011).
- Road transportation in India faces a number of problems.
- Keeping in view the volume of traffic and passengers, the road network is inadequate.
- About half of the roads are unmetalled and this limits their usage during the rainy season.
- The National Highways are inadequate too.
- Moreover, the roadways are highly congested in cities and most of the bridges and culverts are old and narrow.
- However, in recent years fast development of road network has taken place in different parts of the country
- **RAILWAYS** Railways are the principal mode of transportation for freight and passengers in India.
- Railways also make it possible to conduct multifarious activities like business, sightseeing, pilgrimage along with transportation of goods over longer distances.
- Apart from an important means of transport the Indian Railways have been a great integrating force for more than 150 years.
- Railways in India bind the economic life of the country as well as accelerate the development of the industry and agriculture.
- The Indian Railway have a network of 7,133 stations spread over a route length of 64,460 km with a fleet of 9,213 locomotives, 53,220 passenger service vehicles, 6,493 other coach vehicles and 2,29,381 wagons as on March 2011.
- The Indian Railway is now reorganised into 16 zones.
- The distribution pattern of the Railway network in the country has been largely influenced by physiographic, economic and administrative factors.
- The northern plains with their vast level land, high population density rich agricultural resources provided most favourable condition for their growth.
- However, a large number of rivers

TYPES OF GAUGES IN INDIA



requiring construction of bridges across their wide beds posed some obstacles.

- In the hilly terrains of the peninsular region, railway tracts are laid through low hills, gaps or tunnels.
- The Himalayan mountainous regions too are unfavourable for the construction of railway lines due to high relief, sparse population and lack of economic opportunities.

- Likewise, it was difficult to lay railway lines on the sandy plain of western Rajasthan, swamps of Gujarat, forested tracks of Madhya Pradesh, Chhattisgarh, Odisha and Jharkhand.
- The contiguous stretch of Sahyadri could be crossed only through gaps or passes (Ghats).
- In recent times, the development of the Konkan railway along the west coast has facilitated the movement of passengers and goods in this most important economic region of India.
- It has also faced a number of problem such as sinking of track in some stretches and landslides.
- Today, the railways have become more important in our national economy than all other means of transport put together.
- However, rail transport suffers from certain problems as well.
- Many passengers travel without tickets.
- Thefts and damaging of railway property has not yet stopped completely.
- People stop the trains, pull the chain unnecessarily and this causes heavy damage to the railway.
- Pipelines Pipeline transport network is a new arrival on the transportation map of India.
- In the past, these were used to transport water to cities and industries.
- Now, these are used for transporting crude oil, petroleum products and natural gas from oil and natural gas fields to refineries, fertilizer factories and big thermal power plants.
- Solids can also be transported through a pipeline when converted into slurry.
- The far inland locations of refineries like Barauni, Mathura, Panipat and gas based fertilizer plants could be thought of only because of pipelines.
- Initial cost of laying pipelines is high but subsequent running costs are minimal.
- It rules out trans-shipment losses or delays.
- There are three important networks of pipeline transportation in the country.
- From oil field in upper Assam to Kanpur (Uttar Pradesh), via Guwahati, Barauni and Allahabad.
- It has branches from Barauni to Haldia, via Rajbandh, Rajbandh to Maurigram and Guwahati to Siliguri.
- From Salaya in Gujarat to Jalandhar in Punjab, via Viramgam, Mathura, Delhi and Sonipat.
- It has branches to connect Koyali (near Vadodara, Gujarat) Chakshu and other places.
- Gas pipeline from Hazira in Gujarat connects Jagdishpur in Uttar Pradesh, via Vijaipur in Madhya Pradesh.
- It has branches to Kota in Rajasthan, Shahajahanpur, Babrala and other places in Uttar Pradesh.
- WATERWAYS Since time immemorial, India was one of the seafaring countries.
- Its seamen sailed far and near, thus, carrying and spreading Indian commerce and culture.
- Waterways are the cheapest means of transport.
- They are most suitable for carrying heavy and bulky goods.
- It is a fuel-efficient and environment friendly mode of transport.
- India has inland navigation waterways of 14,500 km in length.

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- Out of these only 5685 km are navigable by mechanised vessels.
- The following waterways have been declared as the National Waterways The Ganga river between Allahabad and Haldia (1620 km)-N.W.
- No.1 The Brahmaputra river between Sadiya and Dhubri (891 km)-N.W.
- No.2 The West-Coast Canal in Kerala (Kottapurma-Kollam, Udyogamandal and Champakkara canals-205 km) N.W.

- No.3 Specified stretches of Godavari and Krishna rivers along with Kakinada Puducherry stretch of canals (1078 km) N.W.
- No.4 Specified stretches of river Brahmani along with Matai river, delta channels of Mahanadiand Brahmani rivers and East Coast Canal (588 km) – N.W.
- No.5 There are some other inland water ways on which substantial transportation takes place.
- These are Mandavi, Zuari and Cumberjua, Sunderbans, Barak, backwaters of Kerala and tidal stretches of some other rivers.
- Apart from these, India's trade with foreign countries is carried from the ports located along the coast.
- 95 per cent of the country's trade volume (68 per cent in terms of value) is moved by sea.
- Major Sea Ports With a long coastline of 7,516.6 km, India is dotted with 12 major and 187, notified non majors (minor/intermediate) ports.
- These major ports handle 95 per cent of India's foreign trade.
- Kandla in Kuchchh was the first port developed soon after Independence to ease the volume of trade on the Mumbai port, in the wake of loss of Karachi port to Pakistan after the Partition.
- Kandla is a tidal port.
- It caters to the convenient handling of exports and imports of highly productive granary and industrial belt stretching across the states of Jammu and Kashmir, Himachal Pradesh, Punjab, Haryana, Rajasthan and Gujarat.
- Mumbai is the biggest port with a spacious natural and well-sheltered harbour.
- The Jawaharlal Nehru port was planned with a view to decongest the Mumbai port and serve as a hub port for this region.
- Marmagao port (Goa) is the premier iron ore exporting port of the country.
- This port accounts for about fifty per cent of India's iron ore export.
- New Mangalore port, located in Karnataka caters to the export of iron ore concentrates from Kudremukh mines.
- Kochchi is the extreme south-western port, located at the entrance of a lagoon with a natural harbour.
- Extreme south-eastern port of Tuticorin is in Tamil Nadu.
- This port has a natural harbour and rich hinterland.
- Thus, it has a flourishing trade handling of a large variety of cargoes to even our neighbouring countries like Sri Lanka, Maldives, etc. and the coastal regions of India.
- Chennai is one of the oldest artificial ports of the country.
- It is ranked next to Mumbai in terms of the volume of trade and cargo.
- Vishakhapatnam is the deepest landlocked and well-protected port.
- This port was, originally, conceived as an outlet for iron ore exports.

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- Paradwip port located in Odisha, specialises in the export of iron ore.
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- Kolkata is an inland riverine port.
- This port serves a very large and rich hinterland of Ganga- Brahmaputra basin.
- Being a tidal port, it requires constant dredging of Hoogly.
- Haldia port was developed as a subsidiary port, in order to relieve growing pressure on the Kolkata port.
- AIRWAYS The air travel, today, is the fastest, most comfortable and prestigious mode of transport.
- It can cover very difficult terrains like high mountains, dreary deserts, dense forests and also long oceanic stretches with great ease.
- Think of the north-eastern part of the country, marked with the presence of big rivers, dissected relief, dense forests and frequent floods and international frontiers, etc. in the absence of air transport.
- Air travel has made access easier.
- The air transport was nationalised in 1953.
- On the operational side, Indian Airlines, Alliance Air (subsidiary of Indian Airlines), private scheduled



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and Kashmir, Himachal Pradesh and Uttarakhand.

- Indian Airlines operations also extend to the neighbouring countries of South and south-east Asia and the Middle east.
- Air travel is not within the reach of the common people.
- It is only in the north-eastern states that special provisions are made to extend the services to the common people.
- **COMMUNICATION** Ever since humans appeared on the earth, they have used different means of communication.
- But, the pace of change, has been rapid in modern times.
- Long distance communication is far easier without physical movement of the communicator or receiver.
- Personal communication and mass communication including television, radio, press, films, etc. are the major means of communication in the country.
- The Indian postal network is the largest in the world.
- It handles parcels as well as personal written communications.
- Cards and envelopes are considered first-class mail and are airlifted between stations covering both land and air.
- The second-class mail includes book packets, registered newspapers and periodicals.
- They are carried by surface mail, covering land and water transport.
- To facilitate quick delivery of mails in large towns and cities, six mail channels have been introduced recently.
- They are called Rajdhani Channel, Metro Channel, Green Channel, Business Channel, Bulk Mail Channel and Periodical Channel.
- India has one of the largest telecom networks in Asia.
- Excluding urban places more than two-thirds of the villages in India have already been covered with Subscriber Trunk Dialing (STD) telephone facility.
- In order to strengthen the flow of information from the grass root to the higher level, the government has made special provision to extend twenty-four hours STD facility to every village in the country.
- There is a uniform rate of STD facilities all over India.
- It has been made possible by integrating the development in space technology with communication technology.
- Mass communication provides entertainment and creates awareness among people about various national programmes and policies.
- It includes radio, television, newspapers, magazines, books and films.
- 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.
- Doordarshan, the national television channel of India, is one of the largest terrestrial networks in the world.
- It broadcasts a variety of programmes from entertainment, educational to sports, etc. for people of different age groups.
- India publishes a large number of newspapers and periodicals annually.
- They are of different types depending upon their periodicity.

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- Newspapers are published in about 100 languages and dialects.
- India is the largest producer of feature films in the world.
- It produces short films; video feature films and video short films.
- The Central Board of Film Certification is the authority to certify both Indian and foreign films.