

## Chapter 19: Industries in India (Agro-Based)

The term 'manufacture' means the making of goods or wares by manual labour or by machinery especially on a large scale.

### Manufacturing Industries:

- Manufacturing may be defined as the processing of raw material to enhance its value.
- For example, the amount of raw materials used in the manufacture of a watch is small and costs very little, but the finished product (watch) is expensive and valuable.
- Similarly, the cost of raw materials used in the manufacture of pharmaceutical products is much less than that of the final product (medicine).
- Manufacturing industries are engaged in processing and altering of raw materials and semi-finished products into finished products. For example, wheat is not directly used in its raw form. It has to be ground into flour and then baked to be used by humans.

### Need of Industrialization:

- Industrial growth of a country determines the strength of a nation. A country is considered a wealthy one when it succeeds in transforming its raw materials into a variety of manufactured goods.
- Industrial development not only provides opportunities for employment but also helps in modernizing agriculture which forms the base of the Indian economy.
- Moreover, industrialized countries have a favorable balance of trade as they earn a lot by exporting their products.

### Factors affecting the infrastructure of Industries:

- The infrastructure of an industry depends on two factors, geographical and commercial.

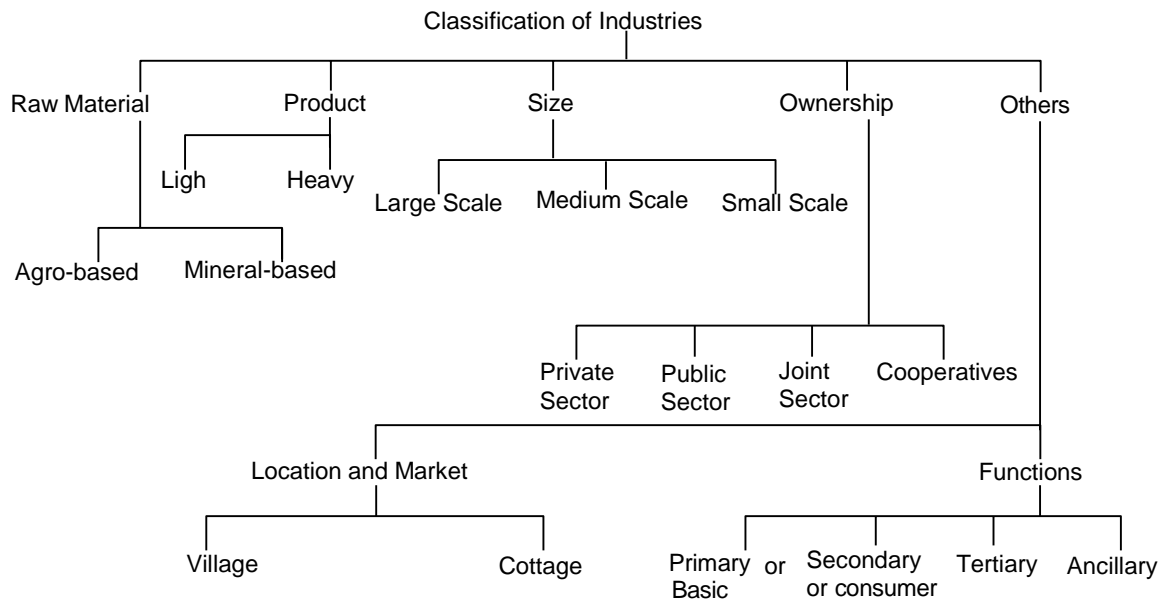
#### Geographical Factors:

- ◆ The constant and assured supply of raw materials.
- ◆ Supply, of the cheapest source of energy.
- ◆ Proper supply of water.
- ◆ Efficient means of transport.
- ◆ An easy access to the market.
- ◆ Availability of skilled labour at reasonable wages.
- ◆ Climate also plays a major role in the location of an industry.

#### Commercial Factors:

- ◆ Capital in the setting up and expansion of an industry.
- ◆ Trained and motivated technical management.
- ◆ State Government also plays an important role to give concession in taxes.
- ◆ Industries are classified in various ways according to various dimensions.

# Classification of Industries:



## Distribution of Industrial Regions:

- In India, four areas with higher concentrations of industries are:
  - ◆ **The Western Industrial Region:** Mumbai–Pune and Vadodara–Ahmedabad belts.
  - ◆ **The Eastern Industrial Region:** Chottanagpur belt. And Hoogly Belt
  - ◆ **The Southern Industrial Region:** Cities of Bangalore, Hyderabad, Madurai, Coimbatore and Chennai.
  - ◆ **The Northern Industrial Region:** Delhi-Sahranpur-Ambala-Gurugram

## Agro-based Industries:

- Those industries which their raw materials from agriculture are called **agro-based industries**. **Textile industry** and **sugar industry** are examples of agro-based industry.
  - ◆ Textile has traditionally meant a woven fabric. The term comes from Latin word 'texere', meaning to weave.
  - ◆ On the basis of raw materials used, the textile industry can be divided as – **Cotton textile, woollen textile, silk textile and jute textile**.
  - ◆ Cotton textile industry is one of the greatest industries of India. The first textile mill set up near Kolkata in 1818. But it really made a start in Mumbai when a cotton textile mill was set up there exclusively out of Indian capital in 1854.
  - ◆ Cotton industry provides living to farmers cotton–boll pluckers and workers engaged in ginning, spinning, weaving dying designing and packing.
  - ◆ The important centres of cotton textile industry in India are Mumbai, Ahmedabad, Coimbatore, Madurai, Indore Nagpur, Sholapur, Kolkata, Delhi, Bangalore and Hyderabad.
  - ◆ **The problems faced by cotton textile industry** are inadequate supply of raw material, out– dated machinery and low productivity of workers, fast changing fashion and design uneconomical unit, and competition in foreign markets and synthetic fibre.
  - ◆ **Handloom and Khadi** industry retains our hoary trade of providing large scale employment in one's home and cottages.
  - ◆ **Silk textile industry**, a small scale industry, plays an important role in the economy of our country as it provided employment to over 4 million people. There are two varieties of silk – **mulberry silk** and **non–mulberry silk**.

## Sugar Industry:

- ◆ Sugar industry is one of the most important agro-based industries in India. It employs about 2.5 lakh skilled and unskilled workers. India is second in the world production of sugar.
- ◆ Gur or jaggery and khandsari are made from sugarcane juice by indigenous method, and sugar is produced by sugar factories. **Molasses, Bagasse** and **Press mud** are the by–products of sugar industry.
- ◆ **Distribution of sugar cane:** Maharashtra, northern India, peninsular India.
- ◆ Sugar industry in India suffers from various problems such as:
  - Inferior quality with low sugar content.
  - Short period of crushing season.
  - Less and irregular supply of raw material.
  - Imbalanced distribution of sugar mills.
  - Wastage of some amount of cane due to pressure on sugar mills at the same time.
- ◆ **Tendency of the Industry to Migrate to the South:**
  - In South India the favourable maritime climate free from the effects of summer *loo* and winter frost is best suited for growing superior varieties of cane. So there is a longer production period.
  - The black soil here is more fertile than the alluvial soil of the northern India. Besides this, the black soil is well drained.
  - The cane is of superior quality with higher yield.
  - The excellent transport facilities, especially in the states of Maharashtra and Tamil Nadu, in relation to export markets have placed these states in a very advantageous position for the further expansion of the sugarcane industry.
  - The sugarcane farms in South India have bigger area and are managed by the cooperative societies. These cooperative societies have access to better facilities like better seeds, fertilizers, irrigation, etc.
  - Sugar is a weight losing crop. i.e., its sucrose content goes on decreasing with time. Since the factories in southern India are located near the fields, loss of sugar content due to transportation is minimum.
  - New machinery and crushing devices ensure more yield.

## QUESTIONS AND ANSWERS

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### Section I: [2 Marks]

**1) What are large scale industries? Give two examples.**

Ans: Industries are large or small on the basis of the number of workers employed and the amount of capital invested. Industries employing a large number of skilled as well as unskilled workers and investing huge capital for the purchase of raw materials, machinery and other expenditures are called large scale industries. Iron and steel, and cotton textiles are the examples of large scale industries.

**2) What is a small scale industry?**

Ans: An industrial unit which has an investment of not more than Rs.7.5 lakh, irrespective of number of workers employed is known as a small scale industry.

**3) What do you understand by village and cottage industries? Give examples.**

Ans: i) Industries situated in rural areas and also catering to the demand of local markets are considered village industries, for example, khadi, khandasari, gur, vegetable oil manufacturing etc.

ii) Industries in rural areas, in which the members of the family, work as artisans and craftsmen and work with stone, brass, ivory, wood and cane, etc. are known as cottage industries. Sometimes, cottage industries are located in towns also.

**4) What are the salient features of the cottage industries in India?**

Ans: i) Cottage industries in India are traditional in their techniques and production of goods.

ii) Cottage industries depend on raw materials which are available locally.

iii) Units are established in the huts, cottages or houses of the producers.

iv) Labour is not hired in these industries; rather work is done by the members of the family.

v) Cottage industries provide subsidiary occupation with agriculture or animal husbandry.

**5) Classify industries on the basis of ownership.**

Ans: i) Public Sector Industries

ii) Private Sector Industries

iii) Joint Sector Industries

iv) Co-operative Sector Industries

**6) Differentiate between public sector industries and private sector industries.**

Ans: Public sector industries are owned and controlled by the government or its agency. Railways, post and telegraphs are public sector industries. Private sector industries are those which are owned and controlled by private houses or individuals. For example, the Birla Jute Mills is a private sector industry.

**7) 'Agriculture and industry are complimentary to each other.' Discuss.**

Ans: Agriculture and industry depend on each other for their growth. Agriculture provides raw materials for certain industries, while industry contributes in raising the productivity of agriculture by providing fertilizers, pesticides, machines, electricity etc., for use in agriculture. Agro based industries such as cotton, jute, food processing depend on agriculture.

**8) What are agro-based industries? Give examples.**

Ans: Those industries which use agricultural products as their raw material are known as agro-based industries. Cotton and jute textiles, vegetable oil and sugar industries are examples of agro- based industries.

**9) Explain why there is industrial concentration in Bihar, West Bengal and Orissa.**

Ans: The area of concentration of industries spread over the three states of Bihar, West Bengal and Orissa is known as Chhota Nagpur plateau or Damodar valley belt which is rich in various minerals. So, availability of raw material, cheap labour and a dense network of roads and railways attract the industries in this region due to lower economic costs.

**10) What is 'sericulture'? Also mention its two types.**

Ans: The rearing of silkworms to produce raw silk is known as sericulture. Fresh mulberry leaves are fed to the silkworms and thread is unravelled from the cocoons on small spinning machines. Sericulture is of two types: (i) mulberry and (ii) non-mulberry. The mulberry sector accounts for nearly 90 per cent of the natural silk produced in India.

**11) Name the by-products of the sugar industry. Also discuss how they are commercially important.**

Ans: The by-products are molasses and bagasse. Molasses, dark brown syrup, is used in the manufacture of fertilizers, alcohol, rum, yeast, etc. After extraction of juice crushed sugarcane is called bagasse. It is used as cattle feed, organic fertilizer, fuel, and raw material in paper mills.

**12) With the help of an example, explain how agro based industries are different from mineral-based industries.**

Ans: Those industries which use agricultural products as their raw materials are known as agro-based industries, for example, cotton textiles, vegetable oil and sugar industries.

Industries which depend for their raw materials on minerals are known as mineral-based industries, for

example, iron and steel and ship-building industries.

**13) With the help of an example each, differentiate between Basic and Consumer industries.**

Ans: Basic industries are those industries on which various other industries depend eg. Iron and steel industry.

Consumer industries are those industries which produce various items to fulfill the day-to-day requirement of the consumers eg. Sugar industry/ Plastic industry.

**14) What industries are included under the term 'textile industry'? What are the raw materials for each of them?**

Ans: Textile is a broad term which includes all the five fibers—cotton, jute, wool, silk and synthetic fiber. The textile industry of India is the first manufacturing industry in India. It occupies an important place in terms of employment generation. It is the oldest among the modern manufacturing industries.

**15) What factors have favoured the localization of the cotton textile industry in Mumbai?**

Ans: i) India's first successful modern cotton textile mill was set up in Mumbai. It is known as the 'Lancashire of India' as the black cotton soil in the hinterland of Mumbai produces cotton which is the basic raw material for this industry.

ii) Mumbai's location as an international port helps in the import of good, long-staple cotton, machinery and the export of finished goods.

iii) Banking facilities and cheap hydroelectric power available from the Tata hydroelectric grid from the Western Ghats are advantageous to Mumbai's cotton industry.

**16) What makes Khadi and Handloom sector of the textile industry still very important even in this modern large-scale industrial era? Give two reasons to justify your answer.**

Ans: Khadi and handloom sector of textile is competing with modern industry with its innovative colours, styles, diversification, choice, rate and corporate ethics. The following are the reasons of its importance:

i) It is a widespread industry which provides large employment and contributes about one-fifth of the total cloth production.

ii) They can be started with low investment by using local raw material and local talent encouraging optimum use of national resources.

**17) Explain why, Sugar mills in the cooperative sector have an advantage over those in the private sector.**

Ans: The cooperative movement has made greater headway in the south than in north. Sugar is seasonal industry and so labour cannot be employed in this industry throughout the year. That is why sugar mills in cooperative sector have an advantage over those in the private sector. The sugar mills are owned and managed by the farmers so they have work throughout the year. There is growing demand in Northern India to nationalize the sugar industry.

**18) What are cooperative industries? Which category of industries is ideally suited to it?**

Ans: Industries can be classified on the basis of sources of management, raw material, size, location and nature of product.

i) The co-operative industries are based on a management basis. These are, as the name suggests, owned and managed on a co-operative basis by those who are producers of the raw materials of these industries.

ii) The government has set up cooperative societies like 'IFFCO' and 'KRIBHCO'. The industries ideally suited for these are sugar mills run by farmers producing sugarcane. Also, the dairy industry, specially in Gujarat, is a co-operative industry.

**19) Name the important centres of silk in Karnataka and Assam.**

Ans: In Karnataka – Bangalore and Mysore.

In Assam – Nagaon, Kamrup and Goalpara.

**20) Mumbai–Pune region is the most important industrial region of India. Substantiate the statement giving two reasons.**

Ans: Mumbai-Pune region is the most important industrial region of India because of the following reasons: (i) Availability of raw materials (ii) Sufficient power resources, (iii) Availability of transport facilities, (iv) Proximity of port.

**Section II: [3 Marks]**

**1) Why is Karnataka famous for the silk industry?**

Ans: The following conditions in Karnataka favour the growth of silk industry in Karnataka:

i) Suitable climatic conditions for silk production.

ii) Availability of soft water in large amount.

iii) Mulberry is grown as bush plantation.

**2) Why more than 60 per cent of Sugar mills of India are located in the sugar belt comprising Uttar Pradesh and Bihar?**

Ans: It is because of the following reasons:

- i) The Ganga plain has fertile soil and heavy rainfall suitable for sugarcane cultivation.
- ii) Cheap labour is easily and regularly available from this densely populated plain of India.
- iii) Coal, the main source of energy used in sugar factories is available from nearby coal mines of Bihar.
- iv) This sugar belt is also a large consumer of sugar. So easy market is available.

**3) Why sugar industry has shown tendency to shift towards the south? Give four reasons.**

Ans: i) Sugar mills in the south are in the co-operative sector. Thus, people do more work and get better dividends here under co-operative movement.

- ii) Labour is comparatively cheaper in south India.
- iii) In south, sugar mills are closer to the fields. This proximity prevents the loss of sugar content in transportation.
- iv) There is a strong sugar lobby in Maharashtra which invests in sugar industry and tries to get maximum returns.

**4) What are the four special features of the cotton textile industry in India?**

Ans: The four special features of cotton textile industry in India are:

- i) It is oldest and largest industry in India.
- ii) It is the most widespread industry found in most of the states of India.
- iii) This industry provides employment opportunities both in rural and urban areas.
- iv) This industry accounts for the largest proportion of foreign exchange.

**5) State four geographical factors which should be kept in mind while setting up an agro- based industry.**

Ans: Four geographical factors to be considered are as follows:

- i) Proximity to growing areas.
- ii) A well-developed transport system.
- iii) Facilities for proper storage of the raw materials as well as finished products.
- iv) There should be a good demand for the product.

**6) Despite being the largest producer of sugarcane, why is India ranked second in world production of sugarcane?**

Ans: i) India despite being the largest producer of sugarcane, is ranked second in its production as the yield per hectare is low, compared to other sugarcane producers in the world. This has resulted in low productivity and shortage of supply of sugarcane to mills.

- ii) As this industry is primarily agro-based and hence seasonal, there are fluctuations in the output of sugarcane. Fluctuations in the production of sugarcane occur because of the erratic nature of the monsoons.

**7) Why is there an increasing demand for handloom materials?**

Ans: i) The Khadi and handloom industry supplies more than one-fifth of the cloth produced in the country. These products are in great demand are relatively cheap and help to build the Indian economy with foreign exchange earnings.

- ii) These products are run by the cooperative sectors. More than half of its production comes from local sources and with low investment. The Handloom and Khadi industry provides employment to 100 lakh people in the country and curbs migration to cities.

**8) State two non-geographical factors that determine the location of industries in India.**

Ans: The infrastructure of an industry depends on geographical factors and non-geographical factors.

The two important non-geographical factors are:

- i) **Capital:** The most important factor in setting up an industry, as most of the industries requires huge investments. Financiers and capitalists are available in big cities. That is why industries are set up in metropolises.
- ii) **Technical knowhow** is necessary. The government plays an important role in the planning and location of industries, besides solving problems of public pollution and disparities. They set up industrial zones where it supplies land, water and electricity.

**9) How do the cottage industries play an important role in the Indian economy?**

Ans: i) Cottage industries provide jobs to millions of people. Thus, these industries create not only wages for people but also check their migration to urban areas.

- ii) These industries can be started with low investment. So, these units help in earning additional income.
- iii) Use of local raw material in these industries helps in the optimum utilisation of national resources.

- iv) Their products earn a lot of foreign exchange for the country.
- v) These industries generate seasonal as well as perennial employment for labour. Thus, cottage industries play a significant role in our national economy.

**10) Discuss the factors affecting the location of industries.**

Ans: Important factors affecting the location of individual industries can be enumerated as follows:

- i) **Availability of raw materials:** Those industries which use heavy and bulky raw material of small value tend to be located near the source of raw material. It is because, raw material which is weight loosing, if transported from a distance will increase the cost of the final product. Hence, cement industry, sugar industry and iron smelting industry are attracted towards the sources of raw materials.
- ii) **Power resources:** To run the machinery, fuel is a must. Coal is the cheapest source of power but it is bulky and involves high transport costs. Those industries which use large quantities of coal are generally found near the coal mines. Electrochemical and Electrometallurgical industries which require a large amount of cheap electric power are installed in areas producing electricity in abundant quantity. Transmission of electricity, of course, has helped in the dispersal of industries away from coal mining areas.
- iii) **Labour supplies:** Each industry requires a particular type of cheap but adequate supply of labour. Industries which require highly skilled labour are attracted towards big urban centres. In some cases, labour with inherited skills is immobile and industry goes there to get their services, for example, glass industry in Firozabad and dyeing and printing industry in Farrukhabad. In industries where a large number of workers are required, labour migrates to the industrial centre because labour is mobile and seeks bright prospectus for regular work at high wages. Maruti car factory in Gurgaon has attracted labour from almost all parts of the country.
- iv) **Transport:** Cheap and efficient means of transport are essential for carrying raw materials and labour to the factory and finished products to the market. That is why big industries are always located near railway junctions or highways. Ports also developed as industrial centres due to the facility of import and export at cheaper costs.
- v) **Market:** Market is the ultimate destination of all products manufactured in industries. Nearness to the consumers not only saves transport cost but also helps the industry to know about changing habits and preferences of consumers.
- vi) **Government policies:** For balanced economic development, government encourages industries in backward areas by granting subsidies, tax concessions, loans, cheap land and electricity, etc.
- vii) **Miscellaneous factors:** Finance, momentum of early start, climate and personal preferences, etc., are some of the other factors which also affect the localisation of industry.

**11) Why cotton textile mills are concentrated in and around Mumbai and Ahmedabad?**

Ans: The following reasons are responsible for concentration of a large number of cotton textile mills in Mumbai and Ahmedabad:

- i) **Raw materials:** Raw cotton is easily available from the nearby cotton growing areas of the Deccan plateau.
- ii) **Climate:** Mumbai and Ahmedabad enjoy maritime climate in which thread of cotton does not break.
- iii) **Source of power:** The Western Ghats provide suitable conditions for the generation of cheap hydro-electricity, required for this industry.
- iv) **Transport facility:** Both Mumbai and Ahmedabad are connected to the rest of India by developed means of transportation.
- v) **Labour:** These textile centres being old, skilled and unskilled labour are easily available here.
- vi) **Port facility:** Mumbai and Kandla are the ports which handle import of machinery and export of cotton textile products.
- vii) **Finance:** There is no dearth of financial and banking institutions to make available finances for the growth of this industry.

**12) What major problems are being faced by the Indian cotton textile industry? Explain.**

Ans: i) **Old and outdated machinery:** Cotton textile industry is one of the oldest industries of India. So it has a major problem of old and outdated machinery which are inefficient and, hence, uneconomic.

- ii) **Fluctuations in the production of raw material:** Production of cotton is uncertain. It fluctuates depending on the climatic conditions. It makes the supply of raw material irregular.
- iii) **Poor quality of cotton:** Fine quality of cotton is not produced in India. For manufacturing fine and costly cloth, we have to import fine quality cotton from other countries.
- iv) **Competition in global market:** Our products face tough competition in international market from countries like Japan, Korea, the USA and Taiwan both in cost and quality. These countries are equipped with latest and advanced machinery.
- v) **Rivalry:** Strikes, lock-outs and market rivalry have also made the industry sick.

**13) Discuss the problems of the sugar industry in India at present.**

Ans: i) It is a seasonal industry in which labour cannot be employed throughout the year. This decreases the

efficiency of workers.

- ii) In general, sugarcane is grown by small cultivators who sell their produce directly to the mill owners. Thus, farmers get less return, as they are not organised.
- iii) Delay in transporting sugarcane to the mills in some parts of the country also results in the lowering of the sucrose content.
- iv) In large parts of India, especially in the north sugarcane grown is of lower quality.
- v) Sugar mills are old methods of production are inefficient and uneconomical.
- vi) The by-products of sugar industry are also not utilized properly.

**14) What are the problems faced by the sugar industry in North India? Give any two reasons.**

Ans: India ranks second in the world production of sugar. The northern sugarcane producing states are Uttar Pradesh, Bihar, Punjab and Haryana.

- i) The industry faces problems as the crushing season is short. Therefore, our sugar factories do not have work all the year round. This leads to a higher cost of sugar compared to the one produced in other countries.
- ii) The areas producing sugarcane are far away from factories. This increases the cost of sugar and decreases the sucrose content. The sucrose content decreases rapidly after 24–48 hours of harvesting the cane.

**15) What are the types of silk produced in India? Where is it exported? Where does India import its silk from?**

Ans: i) There are two varieties of silk (a) Mulberry and (b) Non-Mulberry.

Mulberry silk is found in Mysore, Bangalore, Belgaum, Srinagar and Himachal. Non-mulberry varieties are tassar, en, and muga found in Assam, Bihar, Orissa and Meghalaya.

- ii) Most of the silk products are of high-grade artistic designs. A large quantity of silk goods is exported to Sri Lanka, Singapore, Hong Kong, Malaysia, USA, UK and other European countries, East African countries, and Middle East countries.
- iii) India produces about 60% of raw silk. The rest is imported from Japan and Italy. Imported silk has a high import duty and is of superior quality.

**16) With reference to Khadi, state the following:**

- i) **What is its historical importance?**
- ii) **What measures have been taken for its improvement?**
- iii) **What is its role in the Indian economy?**

Ans: With reference to the Khadi industry.

- i) The Khadi industries are the traditional primitive industries of India. They played an important role in India's freedom struggle. The people adopted Khadi clothes instead of foreign goods. These industries are carried out by the village people on a small scale.
- ii) Remedial steps are taken by the government to improve the industry. They have established the All India Handloom Board where credit facilities are available from banks and financial institutions. They began access on mill cloth to encourage handloom production.
- iii) The Khadi industry has now become a major foreign exchange earner. To boost the economy, trade fairs are organised for Khadi products.

**17) Discuss the problems faced by Handloom and Khadi industries.**

Ans: a) The quality and quantity of raw materials are not satisfactory.

- b) The craftsmen are poor and have no technical knowledge.
- c) The looms are outdated.
- d) The products are unable to keep up with the fast changing latest fashions.
- e) The Khadi and handloom products face stiff competition from mill-made cloth.
- f) There are no proper facilities for cheap credit.

**18) Why Karnataka is famous for the silk industry?**

Ans: The following conditions in Karnataka favour the growth of silk industry in the state:

- i) Suitable climatic conditions for silk production.
- ii) Availability of soft water in large amount.
- iii) In Karnataka, mulberry is grown as bush plantation.

**19) Explain why:**

- i) **Carpet-making as a cottage industry has developed in the Kashmir valley.**
- ii) **The pure silk handloom industry is important in Bangalore.**



Ans: i) Carpet-making as a cottage industry has developed in Kashmir valley because in this area, sheep are reared for wool which is essential material for weaving the carpets skilled traditional craftsman is also available. Besides woollen carpets are in great demand.

ii) The pure silk industry is important in Bangalore because of the large scale rearing of silk- worms on the mulberry leaves.

#### PREVIOUS BOARD QUESTIONS:

- 1) a) Name and define two important by-products of the sugar industry.  
b) Give two reasons by why the state of Punjab is the largest producer of woollen textiles.  
c) Mention three main problems of the Jute textile industry in India.  
d) With reference to the cotton, textile industry:
  - i) Which is the country's most important manufacturing center?
  - ii) State two geographical reasons for its importance. [2011]
- 2) a) Give two reasons why the woollen industry has not developed as well as the cotton industry in India.  
b) State two factors which favour the silk industry in Karnataka.  
c) Mention three problems of the sugar industry in India.  
d) In what way does the cotton industry contribute to the economy of India?  
Mention any three relevant factors. [2012]
- 3) a) Name any two large sugar producing states, one each in north and south India.  
b) Name an agro-based industry based in the following industrial centres:
  - i) Ahmedabad
  - ii) Mysore  
c) State three favourable conditions responsible for the growth of the jute industry in West Bengal.  
d) Give geographical reasons for the following:
  - i) It is necessary to crush sugar cane within 24 hours of harvesting.
  - ii) Sericulture flourished in Karnataka. [2013]
- 4) a) Name two textile industries using any animal fiber. Name an important State where these industries are located.  
b) Give two reasons for each of the following:
  - i) Kolkata is an important cotton manufacturing centre even though West Bengal is not a leading producer of cotton.
  - ii) Sericulture flourished in Karnataka.  
c) Mention three factors that have helped the sugar industry flourish in the peninsular region rather than in northern regions of India. [2014]

## Chapter 20: Mineral Based Industries

### Mineral Based Industries

- Iron and Steel Industry
- Petrochemical
- Electronics

### Synopsis:

- ❖ Those industries which are based on minerals are called mineral-based industries. Iron and steel industry, cement industry, and chemical industry are examples of mineral-based industries.

### Iron and Steel Industry:

- Iron and steel industry is a basic industry and is a key to other industries.
- Iron is one of the most abundant chemical substances in the earth's crust. But it is never found in pure form in the earth's crust.
- Almost all iron occurs in ores. To obtain iron, is combined in reducing agents, coke and limestone, at high temperatures. The molten material runs off into moulds or pigs.
- Steel is produced by refining iron and mixing it with other metals. In general, steel is an alloy of iron and carbon.
- Almost all kinds of steel contain some manganese. Other elements used in alloy steel include nickel, aluminium, chromium, copper, silicon etc.

- There are three chief methods of steelmaking – the basic oxygen process, the electric furnace process, and the open–hearth process.
- Most steel is produced from molten pig iron, which contains impurities such as carbon, phosphorous, silicon and manganese.
- All these impurities are reduced by melting the pig iron and oxidizing the impurities.
- The steel, so obtained, is cast into huge ingots which are rolled into different shapes and sizes, for example, drain–pipes, gutter covers, weights, railings etc.
- In India, the beginning of the iron and steel industry was made with the setting up of Tata Iron and Steel Company.
- The major iron and steel plants are at Jamshedpur (Jharkhand), Bhilai (Chhattisgarh), Rourkela (Orissa), Durgapur (West Bengal), Bokaro (Jharkhand), Bhadravati (Karnataka), Vijaynagar(Karnataka), Vishakhapatnam(Andhra Pradesh)
- The Tata Iron and Steel Company (TISCO) was started in 1907 at Sakchi in the Singhbhum district of Jharkhand.
- The place, to set up the plant, was chosen because there were deposits of iron ore, coal and manganese, (the raw materials) for the production of steel.
- The Kharki and Subarnarekha rivers were the source of water supply.
- The Bhilai Iron and Steel Plant, the first public sector plant, was started in 1957 in the Durg district of Chhattisgarh.
- It was set up in the collaboration with the USSR. The place, to set up the plant, was chosen because there were deposits of iron ore, coal and limestone, for the production of steel.
- The other reasons for chosen the place were availability of cheap and abundant labour, the river Tendula for water supply, Korba thermal power station for electricity supply and Kolkata–Nagpur railway line for transportation purpose.
- Durgapur Steel Plant was started in 1959 at Durgapur in the Burdwan district of West Bengal. It was set up in the plant, to set up the plant, was chosen because of the following factors:
  - Easily availability of raw material such as iron ore, coal, limestone, dolomite etc.
  - Damodar River for water supply.
  - Abundant labour and good transport facilities.
- Rourkela Steel Plant was started in 1959 in Sundargarh district of Orissa. It was set up with the help of a German firm Krupps and Deemang. The place to set up the plant was chosen because raw material such as iron ore, coal, and limestone are easily available.
- Cheap hydroelectricity is available from Hirakud power project and water supply from Brahmani River.
- It is situated on Mumbai, Kolkata railway route.
- Bokaro Steel Plant was established in 1972 with USSR. It is located in the Hazaribag district of Jharkhand. The geographical factors for setting up this plant are as under:
  - Raw material is easily available.
  - Abundant labour available from nearby areas.
  - Cheap and regular hydroelectricity and water are available from Damodar river
- Indian Iron Steel Company (IISCO) came under public sector in 1972. It produces rails, hot–rolled galvanized sheets.
- The Vishakhapatnam Steel Plant in Andhra Pradesh and the Salem Steel Plant in Tamil Nadu are the two new steel plants of India.
- The major problems which are being faced by iron and steel industry are as under:
  - ◆ Lack of capital investment.
  - ◆ Lack of good quality coal.
  - ◆ Lack of sophisticated and modern techniques of steel production.
  - ◆ Lack of specialization of producing items.
  - ◆ Low quality of products has not been able to complete in international market.
  - ◆ Less demand due to high cost, problems of skilled labour, inadequate supply of power, and low quality of iron–ore are some of other problems being faced by iron and steel industry of India.

### **Petrochemical:**

- ◆ Petrochemical industries produce petrochemicals, i.e. chemicals derived from petroleum or natural gas.

- ◆ Petrochemicals are used in making of such products as detergents, fertilizers, medicines, paints, plastics, synthetic fibers, and synthetic rubber.
- ◆ The basic materials of the industry are ethylene, propylene, butadiene, benzene, toluene, xylene, and gases carbon monoxide and hydrogen.
- ◆ Indian Petrochemicals Corporation Limited (IPCL) and Petrofils Co-operative Limited (PCL) are two big organizations of petrochemical industry. IPCL manufactures petrochemicals like polymers, and PCL manufactures polyester filament yarn.
- ◆ The development, manufacture, and sales of electronic products make up one of the largest and most important industries in the world.

### **Electronic Industry:**

- ◆ The electronic industry is also one of the fastest growing of all industries. The Bharat Electronics Limited, the electronics Corporation of India Limited and the Indian Telephone Industries, etc, are electronic industries.
- ◆ The Bharat Electronics Limited produces defence equipments. The Electronics Corporation of India Limited produces transistorized modular systems for nuclear applications and for use in medical, agri. Ind. field.
- ◆ The Indian Telephone Industries produces equipment required by post and telegraph departments and overseas communication service

## **QUESTIONS AND ANSWERS:**

### **Section I: [2 Marks]**

#### **1) What are key and consumer industries? Give examples.**

- Ans: i) Those industries on which so many other industries depend are called basic or key industries. For example, iron and steel industry or heavy machinery industry are key industries as they provide steel and machines to rest of the industries.
- ii) Consumer or secondary industries are those which produce primarily goods for consumption by people. TV, washing machines, electronic items, bicycles, furniture, watches, utensils, cosmetics etc. are the examples of the consumer industry.

#### **2) How do you differentiate between heavy and light industries?**

- Ans: Industries which use heavy or bulky raw materials and also produce bulky products are known as heavy industries, for example, iron and steel industry. On the other hand, industries whose raw materials and finished products both are not heavy are called light industries, for example, computer, T.V. or watch manufacturing units.

#### **3) Why is Iron and Steel Industry considered a basic or key industry?**

- Ans: Steel industry is considered a basic industry because all other industries depend on it for their machinery. Steel is required in the manufacture of all types of machines and their products right from a small safety pin to a huge ship. Steel is omnipresent in all equipments, engineering goods and household items.

#### **4) When was the first steel plant set up in India?**

- Ans: The history of the modern iron and steel industry in India began in 1870 when the Bengal Iron Works Company set up its plants at Kulti (Burnpur) in West Bengal.

#### **5) What are the four sections of an integrated iron and steel plant?**

- Ans: i) **Mixing of raw materials:** In this section, iron ore, coking coal and limestone are mixed in the proportion of 4 : 2 : 1. Manganese is also mixed.
- ii) **Making pig iron from iron ore:** In a high steel structure, called blast furnace, iron ore is changed into pig iron by melting.
- iii) **Purification:** Impurities of pig iron are oxidized to convert it into steel.
- iv) **Rolling of steel:** Huge ingots of steel are rolled into different shapes and sizes such as rods, beams, sheets, plates, nails, etc.

#### **6) What is the difference between an Integrated Steel Plant and a Mini Steel Plant?**

- Ans: In an integrated steel plant, all the four processes are carried out in one complex from mixing of raw material to shaping the metal.
- Mini steel plants, on the other hand, do not do all the activities rather they use steel scrap in electric furnaces and make liquid steel, which later on is turned into steel ingots..

#### **7) State two advantages of Petrochemicals. Name any two Petrochemical products.**

- Ans: Two advantages of Petrochemicals are that they are used as basic material in many industries and in manufacturing synthetic fibers. Two petrochemical products are lubricating oil and plastic.

#### **8) Why are petrochemical industrial units found mainly in Maharashtra and Gujarat? Give two reasons.**

- Ans: i) Petrochemicals are those chemicals and compounds which are derived from petroleum resources. The units are mostly found in Maharashtra and Gujarat as these regions are mostly abundant in petroleum and coalfields.
- ii) The petrochemicals raw materials are easily available e.g. for the Udex plant at Koyali (Gujarat) raw

material is available from the nearby refinery. It is also economically stable in these two states.

**9) Name four labour intensive industries.**

Ans: i) The industries can be classified on the basis of the source of its raw materials, management, size, location, nature of products. There are large scale medium and small-scale industries.

ii) In the labour-intensive industries local labour is employed. They use hands instead of machines for manufacturing. Such kinds are (i) bidi making, (ii) cracker making, (iii) shoes and (iv) carpentry.

**10) State three advantages of the decentralisation of industries.**

Ans: The decentralisation of industries has the following advantages:

i) It provides employment opportunities in every region of the country thus keeping a check on the concentration of population in certain pockets in the country.

ii) It removes regional disparities in the task of industrialization of the country.

iii) It leads to a more equitable distribution of national income in the country.

**11) What factors determine the location of petrochemical industries? State two of them.**

Ans: i) Petrochemicals are those chemicals and compounds which are derived from petroleum resources. The industry derives its raw materials from coal and LPG. The factors determining this industry are its major raw materials collected from coal and petroleum fields. These industries are concentrated in petroleum and coal field regions.

ii) They are cost effective, and economically stable, and cheaper as they are produced on a mass scale. Its raw material is easily available. Fertilizers are produced from it.

**Short Answers: (3 Marks)**

**12) a) Differentiate between mini steel plant and integrated steel plants.**

Ans:

Integrated steel plant	Mini steel plant
An integrated steel plant is one where all processes are carried out in one complex from handling of raw material, coke-making, steel making and rolling and shaping of the steel.	Steel plants that do not process at one plant are known as mini steel plants or furnaces. They use steel scrap in the electric furnaces to make liquid steel which is turned into ingots.

**b) State two advantages of integrated steel plants.**

Ans: i) All the processes of steel making and steel shaping are done at one complex.

ii) Products are produced on large scale. So cost of production is less.

**c) Mention main disadvantages of mini steel plants.**

Ans: i) Products are not produced on large scale so cost of production is high.

ii) Big machines cannot be manufactured in mini steel plant.

**13) Give four reasons why the iron and steel Industry is concentrated in the northeastern part of the country.**

Ans: The iron and steel industry is concentrated in the north-eastern part of the country due to the following reasons:

a) All the essential raw materials (iron ore) etc. is available in these areas.

b) There is a good network of railways and roads in these areas so finished goods can be easily distributed with in the country and also exported to other countries.

c) Labour, power and other facilities are also available in this region.

d) The water supply is made by the Damodar River and its tributaries.

**14) Describe in brief about the Bhilai Steel Plant, with reference to location, raw materials**

Ans: It is located at Bhilai in Madhya Pradesh. It was set up with the help of U.S.S.R. It enjoys the following localisation facilities:

a) It is situated on the Kolkata-Nagpur railway line. It provides transport facilities.

b) It meets its iron ore requirements from the iron ore mines of Durg, Chanda and Bastar district of M.P.

c) It gets coking coal from Korba coalfields of M.P. and Jharia coalfields of Bihar. It also gets electric power from Korba Thermal Power Station.

d) The manganese comes from Bhandara and Balaghat districts of M.P. and limestone from Nandini mines.

e) It gets water from Tandula and Gondli water reservoirs.

f) The Vishakhapatnam Port provides the sea outlet facilities.

g) It gets thermal power from Korba Thermal Power Project.

**Main Products:** (a) Rails (b) Pig iron (c) Merchant products (d) Heavy structural.

**15) Why most of our steel plants are concentrated around Chota Nagpur Plateau region?**

Ans: The following geographical factors have contributed to the localisation of this industry around Chota Nagpur Plateau region:

i) Iron ore, the basic raw material for this industry, is easily available from mines spread over Jharkhand, West Bengal and Orissa.

ii) Jharkhand and West Bengal are the home of coal, the cheap source of energy for the industry.

- iii) Other minerals required for iron and steel industry, e.g., manganese, dolomite and mica, etc., are available in Chota Nagpur Plateau.
- iv) Regular supply of power is made available from nearby Damodar Valley Corporation.
- v) Cheap labour is available from the tribal areas of Jharkhand, Bihar, Madhya Pradesh, Chhattisgarh and Orissa.
- vi) This region is connected to the rest of India by important roads and railway routes.
- vii) From Kolkata port there is a facility of importing machinery and exporting products.

**16) What are the salient features of Mini Steel plants in India?**

Ans: There are more than 216 mini steel plants in addition to large-scale integrated iron and steel plants. These steel plants have the following characteristics:

- i) Mini steel plants use electric arc furnace and induction furnace to produce steel. Thus, coal is conserved.
- ii) These units use steel scrap/ sponge iron from big steel plants as raw material and, thus, help in recycling of iron and its optimum utilization.
- iii) Mini steel plants do not require huge investments as they do not carry out all the processes of steel making. They can produce mild steel, alloy steel including stainless steel.
- v) Small steel plants can be easily constructed in industrial towns to meet the special steel requirement reducing transport costs.

**17) What suitable geographical conditions are available at Jamshedpur Steel Plant?**

Ans: The Tata Iron and Steel Company (TISCO) is the oldest steel plant of India. Its location at Jamshedpur is due to the following factors:

- i) The basic raw material iron ore is available from Mayurbhanj (Orissa) and Singhbhum (Jharkhand). This bulky raw material, which is required in large quantities being in proximity, saves the transport cost.
- ii) Manganese is available from Keonjhar and Mayurbhanj and limestone from Gangpur (Orissa).
- iii) Coal, a cheap source of energy, is obtained from Jharia (Jharkhand) and hydroelectricity from the Damodar Valley Corporation (DVC).
- iv) Huge requirements of water are met from Subarnarekha and Kharkoi rivers where at their confluence; this steel plant is set up.
- v) Jamshedpur is connected by Kolkata-Mumbai railway route.
- vi) Kolkata port which handles its export and import is also not very far.

**18) What are the situational advantages available to the Bhilai Steel Plant?**

Ans: i) High grade iron ore is available from the district of Durg, Chanda and Bastar. The Dhalli- Rajhara Range is the famous source of iron ore just 97 km away.

- ii) Coal is obtained from Jharia, Raniganj and Korba coal-fields.
- iii) Manganese ore is obtained from Balaghat district.
- iv) Limestone is supplied from Nandini quarries which are about 25 km away.
- v) The Korba Thermal Power Station provides cheap electricity.
- vi) This plant gets water from the Tendula Canal.
- vii) Bhilai is connected with Mumbai-Kolkata railway route.

**19) a) Where is the Rourkela Steel Plant located? With whose assistance this plant was set up?**

Ans: The Rourkela Steel Plant is located in Sundergarh district of northern Orissa. It was set up with the help of a German firm Krupp and Demog.

**b) What are the geographical advantages available to the Rourkela Steel Plant?**

Ans: i) This plant obtains iron ore from Mayurbhanj and Keonjhar districts.

- ii) Coal is available from Jharia, Talcher and Korba coal-fields.
- iii) Limestone from Birmitrapur and dolomite from Hirri quarries in Madhya Pradesh are available.
- iv) Cheap hydroelectricity is available from the Hirakud Power Project and huge amount of water from the Brahmani River.
- v) Rourkela is situated on Mumbai-Kolkata railway route.

**20) What are the geographical factors which determine the location of Bokaro Steel Plant at Bokaro?**

Ans: i) The Bokaro Steel Plant gets iron ore from Noamundi, Bonaigarh, Barsha and Kiriburu.

- ii) Bokaro and Jharia coal-fields which are 65 km away from this plant supply coal.
- iii) Limestone and dolomite are available from Bhavanathpur and Palamau,
- iv) Cheap and regular hydroelectricity and water are available from the Damodar River.

**21) What are the major problems being faced by iron and the steel industry of India?**

Ans: **The major problems faced by iron and steel industry of India are as follows:**

- i) Lack of good quality coking coal.
- ii) Per worker lower production in the plants of the SAIL.
- iii) Lack of sophisticated and modern techniques of steel production.

- iv) Lack of specialisation in producing items.
- v) Low quality of our products has not been able to compete in international market.
- vi) Less demand due to high cost, problems of skilled labour, inadequate supply of power and low quality of iron ore are some of the other problems being faced by iron and steel industry of India.

**22) With reference to the iron and steel industry in India give logical explanations for the following:**

- i) The location of this industry is governed by its close proximity to raw material.**
- ii) This industry is not found in western India.**
- iii) Most of the iron and steel plants are 'Public Sector Undertakings.'**
- iv) Mini steel plants are becoming more popular.**

- Ans: i) Iron and steel industry use heavy and bulky raw material of small value so it is located near the source of raw materials to reduce its high transport costs.
- ii) This industry is not found in western India because of lack of raw material such as iron ore in this region.
- iii) Most of the iron and steel plants are Public Sector Undertaking because of the following reasons:
- a) An iron and steel plant requires huge investment, basic infrastructure, particularly efficient means of modern transport and communication.
  - b) It does not create enough jobs commensurate with huge investment.
  - c) It requires continual updating of technology.
  - d) A long waiting time before it begins to yield dividends.
- iv) Mini steel plants are becoming more popular because they do not do all the activities rather they use steel scrap in electric furnaces and make liquid steel, which later on is turned into steel ingots. They can produce mild steel, alloy steel including stainless steel.

**23) Why are most of the heavy engineering industries connected to the Chota Nagpur region? Give three reasons.**

- Ans: i) The heavy engineering industries are set up in the Chota Nagpur Plateau region as it requires heavy and bulky raw materials. The Heavy Engineering Corporation Ltd. in Ranchi produces castings, forgings and rolls for tools and building plants for the iron and steel industry found here.
- ii) They require enormous amounts of power which is generated from the Dye, i.e. Damodar Valley Project, for this industry.
- iii) Intensive labour is required providing considerable employment in this area. These are available in the states of Bihar, Orissa and West Bengal. Cheap labour is found due to illiteracy and high population here.

**24) Name three production units of the petrochemical industry, in terms of their location, and their products.**

- Ans: Petrochemicals are those chemicals and compounds which are derived from petroleum resources. The three production units are:
- i) The first petrochemical complex was established by Union Carbide India Ltd. at Trombay. The technology and management is done by the multinational. It produces polypropylene, ethyl acetate, butyl spirit, etc.
  - ii) The Indian Petrochemical Corporation Ltd. (IPCL) at Jawaharnagar near Vadodara in Gujarat manufactures and distributes various petrochemicals such as polymers, synthetic organic chemicals and polyester fibers.
  - iii) Petrofils Cooperative Ltd. (PCL) is a joint-venture company of the Government of India and the Weavers Cooperative Society. It produces polyester filament yarn at its three plants located at Vadodara, Naldhari in Gujarat.

**25) What is a consumer industry? Give an example of it. What does growth of a consumer industry indicate?**

- Ans: i) Consumer industries are also called secondary industries. These industries are the ones that convert the raw materials into primary goods for direct use by the consumers.
- ii) Bakeries, paper, textiles and sugar are consumer industries. These use the raw materials directly for the finished products.
- iii) The growth in this industry leads to growth in the fast food industry leading to changes in the consumer's nutrient intake and public health. It leads to a surge in spending and has a direct effect on the consumer price index.

**26) State the importance of Electronics in the field of space technology and entertainment.**

- Ans: Electronics is a modern industry. It has given new dimensions to medical treatment, space, communication equipment, and entertainment industries.
- i) Our space technology is supported by the electronic industry. We have successfully launched indigenously built satellites such as the Apple, and INSAT series. The Indian Space Research Organisation (ISRO) and National Remote Sensing Agency (NRSA) have become pillars of this industry where components and subsystems are electronic.
  - ii) Entertainment: The television and audio industries too bloomed in 1990 as a result of the progress made by the electronic industry. BPL, Videocon, Onida and Philips together had a market share of 83% in TV sales, the audio industry also flourished. The main centres are Mumbai, Kolkata, Chennai and Pune.

## PREVIOUS YEARS BOARD QUESTIONS:

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- 1) Give two reasons to explain why there is a need for rapid industrialization in India. [2000]
- 2) Why is there an increasing demand for handloom materials? [2000]
- 3) Name a state famous for mulberry silk. [2001]
- 4) Mumbai-Pune region is the most important industrial region of India. Substantiate the statement giving two reasons. [2001]
- 5) Give two reasons to show why the sugar industry has flourish in Uttar Pradesh and Bihar.[2002]
- 6) Give two reasons for the following:  
"The silk handloom industry is important in Mysore. [2002]
- 7) With the help of an example each, differentiate between Basic and Consumer Industries. [2004]
- 8) The 'Khadi and Handloom Sectors of the Textile Industry cannot be ignored'. Give two reasons justifying this statement. [2004]
- 9) State four geographical factors which should be kept in mind while setting up an agro-based industry. [2005]
- 10) Mention three main problems faced by the cotton textile industry in India. [2005]
- 11) Name three by-products of the sugar industry. Give one important use of each. [2005]
- 12) Mention two problems faced by the sugar industry in India. [2006]
- 13) Mention three factors that favour the concentration of the cotton textile mills in Mumbai. [2006]
- 14) a) State two reasons of the concentration of the sugar industry in Uttar Pradesh.  
b) Mention two ways in which the agro-based industries have affected the economy of India.  
c) State three main problems fed by the cotton textile industry in India. [2007]
- 15) a) From where does the iron and steel plant of Bhadravati get its iron-ore?  
b) Copy the names of the following two places and write the name of the most important product associated with each:  
i) Raniganj                      ii) Digboi. [2000]
- 16) a) i) Name the foreign collaborators of the following iron and steel plants:  
1) Bhilai                      2) Rourkela                      3) Durgapur                      4) Bokaro.  
ii) Explain the term 'mini-steel plant'.  
iii) Give any two reasons favouring the location of iron and steel plants in North-Eastern part of Deccan.
- 17) a) With reference to Tata Iron and Steel Company, answer the following:  
i) When and where was it set up?  
ii) From where does it get its supply of iron ore, coal, limestone and manganese?  
b) Name the four centres of iron and steel in the public sector which are located in a single geographical region. With whose collaboration was each one of them set up? [2002]
- 18) With reference to the iron and steel industry in India, give logical explanations for the following:  
a) The location of this industry is governed by its close proximity to raw material.  
b) This industry is not found in western India.  
c) Most of the iron and steel' plants are 'Public Sector Undertakings.  
d) Mini steel plants are becoming more popular. [2003]
- 19) With the help of an example, explain how agro-based industries are different from mineral-based industries. [2003]
- 20) State two main uses of heavy chemicals. In which two industries are fine chemicals mainly used? [2004]
- 21) Why are the Iron and Steel Industries concentrated in the Damodar Valley region? [2004]
- 22) With reference to the Cement Industry in India, answer the following questions:  
a) State the importance of this industry.  
b) Name two important raw materials used in the industry.  
c) Name two centres of the industry in Haryana.  
d) Mention any two problems faced by the industry. [2004]
- 23) State the importance of Electronics in the field of:  
a) Space Technology    b) Entertainment. [2005]
- 24) Where do the Bhilai Iron and Steel Industry get its supply of?  
a) Iron-ore                      b) Coal                      c) Limestone                      d) Manganese. [2005]
- 25) State two advantages of Mini Steel plants. [2006]
- 26) Name the following in India:  
a) Two petrochemical units.  
b) A centre of the silk industry. [2006]

- 27) a) Mention two reasons for the concentration of steel plants in the Chota-Nagpur Plateau region.  
 b) Name four petrochemical products.  
 c) What is the importance of the Heavy Engineering industry for the industrial development of India? Name two Heavy Engineering industrial units in India.  
 d) i) What are integrated steel plants?  
 ii) Name one integrated steel plant in the Public Sector. From where does this plant get its requirement of iron ore and coal? [2007]
- 28) a) Mention two reasons why the sugar industry has developed in Maharashtra.  
 b) Give two reasons for the importance of the silk industry in India.  
 c) Give three factors that favour the cotton industry in Kolkata.  
 d) i) Explain why sugarcane must be crushed within 24 hours of harvesting.  
 ii) Name four sugar milling centres in the northern plains. [2008]
- 29) a) Mention two reasons for the importance of the Electronic industry in India's development.  
 b) What is a petrochemical industry? Mention two reasons why petrochemical products are replacing traditional raw materials.  
 c) i) Mention two characteristics of a mini steel plant.  
 ii) From where does the integrated steel plant at Jamshedpur get its iron ore and coal?  
 d) Name the following:  
 i) A shipbuilding yard on the west coast of India.  
 ii) A centre where diesel locomotives are manufactured.  
 iii) The foreign collaborator of the iron and steel plant at Rourkela. [2008]
- 30) a) Why is the silk industry considered as a small scale industry? Name the two types of silk produced in India.  
 b) Name two important silk-weaving centres in Karnataka.  
 c) Name any two by-products of the sugar industry. Give two uses of each.  
 d) Explain two factors affecting the development of the cotton textile in India. [2009]
- 31) a) Which city is known as the electronic capital of India? Name any two major centres of electronic products.  
 b) Most of the petrochemical units are in Maharashtra or Gujarat. Give two reasons to explain why.
- 32) a) What is sericulture? Name any two types of silk.  
 b) Classify industries on the basis of the nature of products. Give one example of each.  
 c) i) Mention two reasons for the importance of the cotton textile industry.  
 ii) Mention one reason responsible for its poor performance.  
 d) Give geographical reasons for the following:  
 i) Kolkata has many cotton mills though cotton is not grown in West Bengal.  
 ii) Karnataka is an important centre for silk.  
 iii) India produces very little cane-sugar though it is one of the largest producers of sugar- cane in the world. [2010]
- 33) a) Mention two reasons for the development of the petrochemical industry in India.  
 b) What is the difference between a public sector industry and one which is in the private sector? Give an example of an industry in each of the two sectors.  
 c) i) How is it advantageous for a mini steel plant (1) to use electric furnaces (2) not to be located close to the location of the raw material?  
 ii) From where does the integrated steel plant at Bhilai get its requirement of iron and coal?
- 34) a) Name and define two important by-products of the sugar industry.  
 b) With reference to the cotton textile industry:  
 i) Which is the country's most important manufacturing centre?  
 ii) State two geographical reasons for its importance. [2011]
- 35) a) Which iron and steel industry of India is located away from the main coal areas? What is the main source of energy in the absence of coal?  
 b) Give two geographical reasons for the growth of IT industries in Bangalore.  
 c) With reference to the Bokaro Steel Plant, from where does it get its  
 i) coal                      ii) iron ore                      iii) water supply?  
 d) Name one important centre each for the production of the following:  
 i) Tractors                      ii) Electronic goods                      iii) Petro chemicals. [2011]
- 36) a) What are petrochemicals? Name any two products made from petrochemicals.  
 b) Why has the electronics industry grown in importance?  
 c) Mention three advantages that a mini steel plant has over an integrated steel plant.



- d) Name:
- i) The iron and steel plant set up with German collaboration.
- 37) a) i) What is the significance of the Electronics Industry in recent times?  
 ii) Name two cities that have leading Software Companies.
- b) Name the steel plants that were set up with Russian collaboration.
- c) Explain three reasons as to why there is a large concentration of iron and steel plants in the Chhota Nagpur Region.
- 38) a) Name one integrated iron and steel plant in the private sector. Where does it obtain its iron and coal from?
- b) Name two raw materials used in the petrochemical industry and state two advantages of petrochemical products.
- c) Give a reason for each of the following:
- i) Vishakhapatnam is a leading centre for ship-building.
  - ii) Mini steel plants cause less pollution than integrated steel plants.
  - iii) The electronic industry has made an impact on both entertainment and education.
- d) Name a manufacturing centre for each of the following industries:
- i) Engines for MIG aircraft
  - ii) Diesel locomotives
  - iii) Software

[2014]

## Chapter 13: Transport

- ❖ India is a land of vast distances from north–south as well as from east–west. So development of cheap and efficient means of transport is essential for the progress of the nation. Transportation is mainly divided into three major.
- ◆ Road Transport
  - ◆ Railway Transport
  - ◆ Water Transport
  - ◆ Air Transport

### Road Transport:

#### Importance:

- Roads are important as they are necessary in the transportation of people and goods over short and medium distances. One such road was constructed by Sher shah, which connected Amritsar to Delhi is called Sher Shah Suri Marg now.

#### Advantage:

- They are cheap and easy to construct and maintain.
- Roads can be constructed in hilly areas as they can negotiate steep slopes and sharp bends.
- Road can act as feeder to railways
- Roads are more flexible than railways Roads are more accessible to different places than railways.

#### Disadvantage:

- Roads are not suitable for long distance travel
- Heavy goods cannot be transported easily by roads.
- Rapid increase of vehicles on the road created more air pollution.
- It is more expensive than rail transportation
- On the basis of importance and maintenance Indian roads can be divided into.
  - **The Golden Quadrilateral:** The Golden Quadrilateral Connects Delhi – Mumbai – Chennai – Kolkata by 6 lane super high way
  - **National high way:** The main roads were constructed and maintenance by Central Public works Department is called National High way. They connect state capitals, big cities and important posts.
  - **North South Corridor:** East–West Corridor and North–South Corridor Compromise National High way Connecting Srinagar to Kanyakumari and East–West Corridor Connecting Slicher (Assam) to

Probander (Gujarat).

- **Fast west Corridor:** Express Ways have been constructed to ensure soft and smooth travel between important towns. Two important express ways are Mumbai – Pune express way and the Kolkata – Durgapur express way.

## Rail Transport:

➤ Railway system is the life line of the countries inland transport. It serves the needs of both passenger and freight. The first rail way was started in India in 1853 between Mumbai and Thane.

### ◆ Indian railways comprise 3 gauges:

- **Broad Gauge:** It has a distance of 1.676 meters between two rails. More than 70% of the Indian railways is broad gauge.
- **Metre Gauge:** The distance between the rails is 1 meters 25% – of the railways is meter gauge.
- **Narrow Gauge:** This rail is two of types:
  - One is 0.762 meters.
  - Another is 0.610 meters. This type is restricted on hilly areas only.

### Limitations:

- There is a big operational problem to the Indian Railway to shift from one gauge to another gauge. It is time consuming and as well as expensive also
- The tracks are not able to carry increased loads and accidents are becoming quite frequent
- Repair and maintenance of bridges constructed is very important.

## Water Transport:

➤ The inland water ways and coastal waterways are the most important water ways are the cheapest means of transport for large and bulky loads. Water ways are unable to compete with road and railways because of its slow speed. One important inland waterway is Ganga.

### Factors affect water transport:

- ◆ Regular flow of Sufficient Water.
- ◆ Silting of the river bed reduced the depth and creates problems for navigation.
- ◆ Water in rivers is sometimes reduced due to the diversion of water for irrigation.
- ◆ The presence of waterfalls, sharps bends along the rivers course minders the developments of waterways.
- ◆ There should be sufficient demand to make it profitable.

### Port:

- A port is a place on the coast with docks where cargo can be unloaded and distributed through land. There are 12 major ports in India.
- Ports of West Coast:
  - Mumbai Port
  - Nhava Sheva / JNPT)
  - Kandla (Gujarat)
  - Kochi (Kerala)
  - Marmagao (Goa)
  - New Mangalore (Karnataka)

#### **Port of East Coast:**

- Tuticorin (Tamil Nadu)
- Chennai (Oldest artificial harbour)
- Ennore (Tamil Nadu)
- Vishakhapatnam (land locked Port in)
- Paradeep (Orissa Andhra Pradesh)
- Kolkata and Haldia Port (W.B.)

## Air Transport:

- Air transport is the fastest mode transport. Aircrafts of one type or another have made it possible to reach the most remote parts of the earth when speed and time are important constraints. This mode of transport is indispensable.

### **Limitations:**

- Cost of air transport provision of air terminal facilities as well as cost of take up and landing rights are all very expensive. Large scale air transport is still quite luxurious.
- It has limited carrying capacity, and the amount of freight that can be carried is restricted by the lack of space.
- Weather conditions can also hamper air transport.

### **Major International Airports:**

- ◆ Indira Gandhi International Airport (New Delhi)
- ◆ Netaji Subhash Chandra Bose International Airport (Kolkata)
- ◆ Sahar International Airport (Mumbai)
- ◆ Meenambakkam International Airport (Chennai)

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### **QUESTIONS AND ANSWERS:**

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- 1) Name the organization who is responsible for the development, maintenance and management of highways in India.**

Ans: National Highways Authority of India (NHAI).

- 2) Name two projects undertaken by NHAI.**

Ans: i) Golden Quadrilateral ii) North–south and East–west corridors

- 3) Name any two major Express Highways of India.**

Ans: i) Ahmedabad – Vadodara expressway ii) Delhi – Gurgaon expressway

- 4) Name the areas where density of roads is low.**

Ans: Rural areas.

- 5) Give any two advantages and two disadvantages of roadways.**

Ans: **Advantages:**

- Road transport is a fast, flexible and demand responsive mode which is capable of providing door to door service.
- It links remote and inaccessible areas such as hilly, tribal, desert and backward areas.

**Disadvantages:**

- Riding quality of roads is poor, bridges are often weak and distressed.
- A large section of the highways has inadequate road pavement thickness.

- 6) a) Name the**

**i) India's first expressway that opened in 2001.**

**ii) Expressway which is the part of GQ Highway Project.**

**b) Give the special features of Delhi–Gurgaon expressway.**

Ans: a) i) Ahmedabad–Vadodara expressway ii) Delhi–Gurgaon expressway

b) Its special features are SOS telephones at every 1.5 km, CCTV surveillance, and a 32 – lane toll plaza at the Delhi–Haryana border.

- 7) What is width of:**

**a) broad gauge? b) metre gauge? c) narrow gauge?**

Ans: a) 1.676 mm b) 1.000 mm c) 762 mm and 610 mm

- 8) What is the another name of broad gauge railway line on the west coastal lowland?**

Ans: Konkan Railway Line.

- 9) What is meant by an expressway?**

Ans: Expressways are cemented six–lane roads, designed to provide smooth high–speed movement without any obstacles like traffic or speed breakers.

- 10) What are the chief means of transportation in India?**

Ans: India has every mode of transport system: b land, air and water Land:

i) Roads ii) Railways

Air: i) National ii) International

Water i) Inland (river, canals, backwaters, creeks etc.)

ii) Seas and ocean routes.

**11) What is the name of the National Airlines of India?**

Ans: Air India.

**12) Why are railways important?**

Ans: Railways are important because they are the main arteries of inland transport. They are the lifelines of the country for large scale movement of traffic, freight and passengers.

**13) What are National highways?**

Ans: National Highways are roads which connect one state with the other and are of national importance. They are constructed and maintained by the central government.

**14) Name the places that are connected by:**

- a) Golden Quadrilateral.
- b) North-South and East-West corridors.

Ans: a) Golden Quadrilateral connects Delhi, Mumbai, Chennai and Kolkata.

b) North-South corridor connects Srinagar to Kanyakumari and East-West corridor connects Silchar to Porbandar.

**15) Name four international ports of India.**

Ans: a) Mumbai                      b) Kochi                      c) Kandla                      d) Vishakhapatnam.

**16) The great plains have more railways than the Himalayan Mountains. Why?**

Ans: The great plains have more railways due to:

- a) High density of population                      b) Rich in agriculture
- c) Greater industrial activity                      d) Level land or plain land.

**17) Enumerate the problems faced by our railways.**

Ans: A Various problems faced by our railways are as follows:

- a) Passengers travel without tickets due to lack of proper vigilance.
- b) They pull chains unnecessarily resulting in the delay of trains.
- c) Thefts and damages of railway property is common.
- d) Railway accidents due to the negligence of authorities is a major problem of Indian railways.
- e) The signaling and the safety systems are all outdated.

**18) How does road transport score over railway transport?**

Ans: a) Road transport requires less investment than railway.

- b) Maintenance cost is also low.
- c) Road transport provides access to difficult terrains.
- d) Roads facilitate the fast transportation of perishable goods and thereby stimulate their production.

**19) What are the three types of railway gauges in India? What is the disadvantage of three gauge- railway system?**

Ans: Three gauges are:

- a) Broad gauge: width between the rails – 1.67 m.
- b) Metre gauge: width between the rails – 1.0 m.
- c) Narrow gauge: width between the rails – 0.76 m.

Different gauges create difficulties in the smooth flow of traffic. If gauges all over become uniform, it will ensure higher speed, cheaper transport and will reduce the inconvenience of changing trains during a journey.

**20) Give a merit and a demerit for each of the following transport systems in India.**

- a) Road transport    b) Rail transport
- c) Inland water transport                                      d) Sea transport
- e) Air transport

Ans: a) Road Transport

**Merits:** (i) The roads link the rural areas to the urban areas. (ii) They can be constructed in hilly, desert and forest areas.

**Demerits:** (i) They are unsuitable for long distances. (ii) Carriage of heavy and bulky commodities over a long distance is very costly.

**b) Rail Transport**

**Merits:** (i) It is suitable for long distance. (ii) Heavy and bulky commodities can be transported by railways.

**Demerits:** (i) Unsuitable for short distance, as it is expensive. (ii) Unsuitable for perishable items.

**c) Inland water Transport**

**Merits:** maintenance cost is less.

**Demerits:** (i) Waterways are very slow. (ii) As the water is being utilized for irrigation, there is less water in the rivers.

**d) Air Transport**

**Merits:** (i) It is the fastest mode of transport. (ii) It can go over unsuitable topography and hilly terrains.

**Demerits:** (i) It is an expensive mode of transport. (ii) It does not connect the rural areas.

**21) State any three merits of roadways.**

- Ans: a) Construction cost of roads is much lower than that of railway lines.  
b) Roads can traverse comparatively more dissected and undulating topography.  
c) Roads can negotiate higher gradients of slopes and as such can traverse mountains such as the Himalayas.

**22) Where and why is the rail transport the most convenient means of transportation in the northern plains?**

Ans: Rail transport is most convenient means of transportation in the northern plains due to level land, high population density rich agricultural resources and greater industrial activity.

**23) Differentiate between district and rural roads?**

Ans:

District Roads	Rural Roads
These roads connect towns and large villages with one another and with district headquarters.	These roads link villages with district roads.
These are mostly unsurfaced and lack bridges and culverts.	These are mostly unsurfaced, narrow and zig-zag tracks unsuitable for heavy mechanized traffic

**24) a) Name the scheme which was launched to provide connectivity to rural areas as part of a poverty eradication measure.**

**b) What are the special features of Mumbai–Pune expressway?**

- Ans: a) Pradhan Mantri Gram Sadak Yojna  
b) The special features of Mumbai–Pune expressway are :  
i) Six–lane concrete highway with 7m – wide divider. An extra lane provided on each side as a hard shoulder.  
ii) separate tunnels for traffic.  
iii) No two–wheelers, three–wheelers or tractor vehicles allowed.  
iv) Provision of motels, workshops, toilets, emergency phones, first aid etc.  
v) Complete fencing to avoid humans and animals crossing the expressway.

**25) a) What is the Golden Quadrilateral (GQ) Project?**

**b) Give any two economic benefits of the GQ**

- Ans: a) The Golden Quadrilateral (GQ) is the largest express highway project in India. It is the first phase of the National Highways Development Project. It consists of building 5,846 km of four / six lane express connecting Delhi, Mumbai, Kolkata and Chennai.  
b) The economic benefits of the Golden Quadrilateral project are:  
i) It will interconnect many major cities and ports.  
ii) It will give a stimulus to truck transport throughout India.  
iii) It will help in the industrial growth of all small towns through which it passes.  
iv) It will provide vast opportunities for transport of agricultural produce from the hinterland to major cities and ports for export.  
v) It will provide job opportunities in its construction.

**26) What are the National Highways? Also write the names of its two major projects?**

Ans: National Highways are highways which run through the length and breadth of the country and connect state capitals, port towns, industrial and mining area and cities and towns of national importance. These highways are maintained by the Central Government

- i) Golden Quadrilateral.  
ii) North–south and East–west Corridors.

**27) a) Why the traffic on National Highways has been growing?**

**b) Explain what steps are being taken by the Government to provide hindrance free traffic movement**

- Ans: a) The traffic on National highways has been growing due to industrialization in the country.  
b) The Government is taking steps to utilize latest technologies and improved management techniques to provide hindrance–free traffic movement. This is being done by widening roads, grade separation, construction of bypasses, bridges, rail–road crossing etc.

**28) Differentiate between :**

**a) National Highways and State Highways**

**b) Broad gauge and metre gauge.**

- Ans: a) i) The National Highways are constructed and maintained by the Central Governments. While the State Highways are constructed and maintained by the State Government.
- ii) The National Highways are main highways running through the length and breadth of the country connecting major ports, state capitals, large industrial and tourist centres. While the State Highways provide linkages with the National Highways, district headquarters, important towns, tourists centers and minor ports with in the state.
- iii) The National Highways facilitates inter–state transport and movement of defence personnel and materials in strategic areas. While the State Highways provide connectivity to important towns and cities as wells as with National Highways or State Highways of the neighbouring states.
- iv) The National Highways has about 70.548 Km. length while the length of state Highways is about 128000 km.

b)

Broad Gauge	Meter Gauge
The distance between rails is 1.676 m	The distance between rails is 1,000 mm.
The total route length is 51,082 km.	Its total route length is 9,442 km.

**29) a) What is the width of (i) single lane and (ii) multi–lane National highways?**

**b) When was the NHAI constituted? Also explain its responsibilities**

- Ans: a) (i) 3.75 m (ii) 3.5 m.
- b) The NHAI was constituted in 1988.
- It is responsible for the development maintenance and management of National Highways. It is currently undertaking the developmental activities under NHDP in phases. In addition to this NHAI is also responsible for implementing other projects on National Highways, primarily road connectivity to major ports in India.

**30) State any two advantages of airways?**

- Ans: i) Air transport is the fastest and comfortable mode of transport.
- ii) It is vital for our internal transport as well as for the links with other countries.
- iii) It is essential for defence of the country and plays a crucial role in times of emergency.
- iv) Remote areas which are not served by railways or roads have to depend on air transport alone.

**31) State any two disadvantages of airways?**

- Ans: i) It is very costliest mode of transport.
- ii) It depends on weather conditions.
- iii) The airport infrastructure demands heavy investment, large expenditure on servicing, replacement and renewals.
- iv) Air transport is run on petroleum (non–renewable source of energy).

**32) Express these in the full form?**

- a) IWAI    b) NHDP    c) NHAI    d) EMUs**

- Ans: a) Inland Waterways Authority of India
- b) National Highways Development Project
- c) National Highways Authority of India
- d) Electric Multiple Units.

**33) Give any two advantages and two disadvantages of water transport?**

Ans: **Advantages of Waterways:**

- i) It is the cheapest mode of transport.
- ii) It is suitable for heavy and bulky goods.

**Disadvantages of Waterways:**

- i) Water transport depends on the conditions of weather.
- ii) Water transport is limited to area where rivers are navigable and oceanic routes exist.

**34) a) Name the :**

- i) biggest port of India**
- ii) first corporatized port of India.**

**b) When was Airport Authority of India established?**

**c) Why has the railway system been divided into 16 zones?**

- Ans: a) i) Mumbai    ii) Ennore
- b) April 1, 1995

c) The growth of Indian Railways in the past 150 years has been phenomenal. Its huge size has put pressure on the centralized management system. Therefore, to ease this pressure, the railway system has been divided into 16 zones

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### MISCELLEOUS QUESTIONS

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- 1) Name the organization who is responsible for the development, maintenance and management of highways in India.
  - 2) Name the Mughal ruler who built the famous Grand Trunk (GT) road.
  - 3) What are advantages of transport system? (Any three)
  - 4) Name two projects undertaken by NHAI.
  - 5) Name any two major Express Highways of India.
  - 6) Name the areas where density of roads is low.
  - 7) Give any two advantages and two disadvantages of roadways.
  - 8) a) Name the:
    - i) India's first expressway that opened in 2001.
    - ii) Expressway which is the part of GQ Highway Project.b) Give the special features of Delhi-Gurgaon expressway.
  - 9) Name the two cities which have Metro rail network.
  - 10) Give the number of Zones the Indian Railways have.
  - 11) What is the width of:
    - a) broad gauge?
    - b) metre gauge?
    - c) narrow gauge?
  - 12) What is the another name of board gauge railway line on the west coastal lowland?
  - 13) Differentiate between district and rural roads.
  - 14) When and why was the Border Road Development Board setup?
  - 15) a) Name the scheme which was launched to provide connectivity to rural areas as part of poverty eradication measure.
    - b) What are the special features of Mumbai-Pune expressway?
  - 16) a) What are International Highways? Give the purpose of such type of highways.
    - b) How many categories are there of the International Highways? Explain.
  - 17) What is meant by an expressway?
  - 18) What are the chief means of transportation in India?
  - 19) Explain the role of roads in the economic development of the country.
  - 20) a) What is the Golden Quadrilateral (GQ) Project?
    - b) Give any two economic benefits of the GQ.
  - 21) What are the National Highways? Also write the names of its two major projects.
  - 22) When and where did the railways begin in India?
  - 23) Differentiate between:
    - a) National Highways and State Highways
    - b) Broad gauge and metre gauge.
  - 24) a) What is the width of (i) single lane and (ii) multi-lane National highways?
    - b) When was the NHAI constituted? Also explain its responsibilities.
  - 25) Write two advantages and two disadvantage of railways.
  - 26) Explain the three categories of track system followed in India.
  - 27) What is the name of the National Airlines of India?
- 
- 28) What is Pawan Hans?
  - 29) State any two advantages of airways.
  - 30) State any two disadvantages of airways.
  - 31) Express these in the full form
    - a) IWAI
    - b) NHDP
    - c) NHAI
    - d) EMUs
  - 32) When and where did the air transport begin in India?
  - 33) Explain the role of Air India in the air transport.
  - 34) On which river system does the National waterway No 1 lie?
  - 35) Write the number of major and non-major ports of India.
  - 36) Give any two advantages and two disadvantages of water transport.
  - 37) In which state the Nehru Trophy Boat Race (Vallankali) is held?
  - 38) Name the:
    - i) biggest port of India
    - ii) first corporatised port of India.
  - 39) On the outline map of India, show the Major sea ports.
  - 40) Which is the second largest port in terms of volume of traffic handled and is the oldest artificial harbour on

the east coast of India?

- 41) Why is road transport difficult in the northern mountainous areas?
- 42) What are the advantages of railways compared to roadways?
- 43) Give two reasons to explain why water transport is considered to be cheap.
- 44) What are the advantages of air transport?
- 45) Name the international airports of India's metro cities.

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### PREVIOUS YEARS BOARD QUESTIONS:

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- 1) a) Why is road transport favoured in the northern plains of India?  
b) Give reasons to explain the lack of rail transport in Northern India.  
c) Name the following.
  - i) An important inland waterway of north east India.
  - ii) One expressway with its terminal cities.
- d) Mention two advantages and one disadvantage of air transport. [2011]
- 2) a) Why has the importance of inland waterways declined? Give any two reasons.  
b) Name two areas where helicopter services may be used?  
c) Mention any three problems being faced by the Indian Railways.  
d) What is the Golden Quadrilateral? Mention any two ways in which it will help in the economic development of the country. [2012]
- 3) a) Give one disadvantage of air transport. Why is it still a popular means of transportation in India?  
b) i) Give two reasons why peninsular rivers are not ideal for navigation.  
ii) Name a port on the east coast which is often hit by cyclones during the months of October and November. [2013]
- 4) a) Why is road transport in India considered more useful than rail transport? State two reasons in support of your answer.  
b) Mention one advantage and one disadvantage each of inland waterways. [2014]

## Chapter 22: Need for Management of Waste

### Introduction:

- ◆ We move waste from one place to another but never get rid of it completely. Nature has recycled waste materials for millions of years.
- ◆ Human population has increased so rapidly during the last century that the environment is now threatened by our activities and the wastes they produce. Much damage is done to the environment by the pollution of air, degradation of soils and contamination of water sources
- ◆ There is a close connection between waste, pollution and the damage to the environment. Waste causes pollution, which in turn causes the damage. Hence, there is an urgent need for management of waste

### Transmission of Diseases

#### Waste on land :

- ◆ Various diseases spread on an epidemic scale due to waste accumulation on land and water bodies. Vectors like flies, mosquitoes, rodents and pet animals transmit these diseases. The waste is a breeding ground for such vectors.
- ◆ Hence, there is an urgent need to manage waste disposal in an effective manner. Here is a list of common diseases spread by mosquitoes, flies, rodents and pet animals.
- ◆ **Housefly:** Typhoid, diarrhea, dysentery, cholera, gastro-enteritis, etc
- ◆ **Sandfly:** Kala-azar, (Black fever) sandfly fever, etc.
- ◆ **Tsetse fly:** Sleeping sickness.
- ◆ **Mosquitoes:** Malaria, filaria, yellow fever, dengue, chikungunya, encephalitis etc.
- ◆ **Rodents:** Plague, salmonellosis etc.
- ◆ Pet animals
  - Dog – Rabies, hydrated diseases, etc.



- Cat – Dermatophytosis, anthrax, etc.
- ◆ Industrialisation and urbanisation pollute water in the following manner.
- ◆ Sewage contains organic matter that cannot be decomposed
- ◆ Industrial and commercial waste has toxic agents including metal salts and complex synthetic organic chemicals.
- ◆ Fertilisers and pesticides produce pollutants. Human beings are affected by pollution.
- ◆ There are also other pollutants like radioactive substances.

### **Human beings are affected by pollution:**

- by drinking contaminated water,
- by using contaminated water for purposes of personal hygiene and recreation.

### **Common water borne diseases**

- ◆ **Viral:** Viral hepatitis, diarrhoea etc.
- ◆ **Bacterial:** Cholera, typhoid, dysentery.
- ◆ **Protozoan:** Amoebiasis, diarrhea
- ◆ **Helminthic:** Roundworm, threadworm.

### **Greenhouse effect and global warming:**

- ◆ The rate of absorption of solar radiation by earth and its emission back into space as infrared waves balances the heat on the earth. This phenomenon plays a very important role in maintaining surface temperature of the earth. The carbon dioxide and other gases form a blanket around the globe which prevents the passage of infrared waves from the earth back into space.
- ◆ Concentration of solar radiation produces much heat, making the earth a very warm place. This phenomenon is similar to that of a greenhouse in which the glass enclosed area gets heated up due to the insulation from the rest of the environment. The warming up of the atmosphere is due to the greenhouse effect. Hence, Global Warming is also known as Greenhouse Effect.

### **Greenhouse gases**

- ◆ There are five gases which are mainly responsible for the Greenhouse Effect and Global Warming. These gases are known as Greenhouse Gases. They are:
  - Carbon dioxide (CO<sub>2</sub>)
  - Methane (CH<sub>4</sub>)
  - Nitrogen oxide (Nitrous oxide)
  - Chlorofluorocarbons (CFC).
  - Water vapour.
- ◆ Then, the sea level will rise by a few meters and most of the cities on the seashore may be submerged and coastal eco-life will be adversely affected.

### **Effects of Global Warming are:**

- ◆ Global temperature is likely to rise by 2°C to 5°C during the next century.
- ◆ Due to rise in temperature by 2°C to 5°C, there is a chance of melting of ice caps on the Earth's poles.
- ◆ As the increase in temperature will be uniform all over the surface of the world, there will be serious climatic changes. This will bring various changes in wind and rain pattern.
- ◆ Higher temperature will cause rise in transpiration, which in turn will affect the groundwater table.

## **Depletion of Ozone Layer**

- The atmosphere is mainly divided into five layers
  - ◆ (i) Troposphere (ii) Stratosphere (iii) Mesosphere (iv) Ionosphere (v) Exosphere.
  - ◆ In the second layer, La, the Stratosphere which lies at the height of 20 km to 50 km from the Earth's surface, lies the Ozone layer. In spite of its low density, the Ozone layer plays an important role in our life.
  - ◆ Due to the presence of Ozone layer, ultraviolet rays and Infrared rays from the sun cannot reach the Earth surface directly. Ozone layer absorbs the harmful ultraviolet rays from the sun and protects the life on the Earth from their harmful effects.
  - ◆ Causes of ozone layer depletion: when the Oxides of Nitrogen (NO and NO<sub>2</sub>) come in contact with Ozone

(O<sub>3</sub>), their chemical reaction destroys Ozone layer. Besides this, supersonic aero planes move through the stratosphere and emit huge amount of Nitrogen gas which depletes the Ozone layer. Another important causative factor of Ozone layer depletion is Chlorofluorocarbons (CFCs), which have strong power to damage the Ozone layer.

- ◆ All the developed and developing countries are using CFCs–type chemicals as refrigerants in aerosol, paints, plastics, foam and thermal insulating materials in spray and packaging industries. During the use of such materials, a lot of CFCs ultimately get dispersed into the atmosphere
- ◆ The ultraviolet rays cause genetic disorders which ultimately affect heredity. Increased concentration of ultraviolet rays disturb ecological balance in marine ecosystem. Green algae, fish and other animals on continental shelves get affected by ultraviolet rays.
- ◆ Plastic become brittle when they come in contact with ultraviolet rays.

## Acid Rain

- Acid Rain means the presence of excessive acids in rainwater. Burning of coal, wood or petroleum produce sulphur and nitrogen. These two react with oxygen and are converted into their respective oxides–sulphur dioxide and nitrogen dioxide, which are soluble in water.
- During rain, these oxides react with large quantities of water vapour in the atmosphere to form acids like sulphuric acid, sulphurous acid, nitric acid and nitrous acid. These acids, when they precipitate together with rain or snow form acid rain.

### Effects of Acid Rain

- ◆ Acid rain increases acidity in the soil and destroys forests and crops.
- ◆ It corrodes buildings, monuments, statues, bridges, fences and railings. For example acid rain produced by the pollutants from the Mathura oil refinery has been turning the white marble surface of the Taj Mahal into yellow.
- ◆ It poses a serious threat to human health, since it contaminates air and water.
- ◆ It affects the human nervous system by causing neurological diseases.
- ◆ Aquatic species are affected due to acid rain.
- ◆ Acid rain affects the plant growth, Plant leaves get burnt and dry.

## Soil Health

- Soil is the foundation for a healthy biosphere. Precipitation from air as acid rain and dry deposition of pollutants on land surface contribute to soil pollution.
- Chemicals and minerals in the soil react with chemical pollutants. These pollutants combine with plant nutrients and the plants are consumed by animals.
- Polluted soils cause reduction in mineralisation and decomposition processes. Transformation of sulphur, nitrogen, availability of phosphorus, biological nitrogen fixation in soil is affected by acid rain. Destruction of the soil is synonymous with the destruction of the biosphere

## Waste management

- One of the easiest ways of management of waste is the '3-R' system, Le. Reduction, Reuse and recycle. We can reduce our use of resources. We can reuse the materials for packaging that is use the same product several times, for example, bottles, containers, etc. We can recycle materials such as glass, paper and metals (like aluminium, cans and steel) from old articles.
- We can recycle the used items to make new material, e.g. cardboard from used paper. There is need to manage the waste properly. Therefore, public awareness of the health hazards of waste is necessary.

# Chapter 23: Impact of Waste Accumulation

## Introduction:

- Accumulated solid wastes when left uncared, start decomposing. A number of pathogenic (disease-causing)

bacteria, virus and fungi grow in these wastes.

- Flies, insects, rodents etc. live in the accumulated waste heaps and carry germs of various diseases to human habitations.
- Decomposition of wastes produces harmful gases that pollute the air around us.
- During rains, rainwater may take the decomposed waste along with pathogens (disease causing germs) to our water bodies (rivers, ponds, wells etc.) and cause water pollution.
- All this leads to outbreak of epidemics and other health hazards.

## **Spoilage of Landscape:**

- Much of the world's solid waste is simply dumped onto vacant land and left to decompose. Open dumps not only ruin the natural beauty of the land but also provide a home to rats and other disease carrying organisms.
- Both open dumps and landfills may contain poisonous substances that seep into the groundwater or flow into streams and lakes.
- Burning of coal, fuel wood or petroleum produces sulphur and nitrogen which react with oxygen and are converted into their respective oxides—sulphur oxide and nitrogen dioxide.
- A chemical reaction occurs between the acid of the acid rain and the buildings. It exerts a pressure on the monument surface leading to corrosion of its body.
- Many monuments are affected by acid rain. Examples are: the Parthenon of Athens, the colosseum of Rome, the Taj Mahal of Agra.

## **Pollution**

- Pollution is caused by man by the addition of waste toxic chemicals through the atmosphere into the biosphere.
- The main sources of waste are domestic, commercial, industrial, municipal and agricultural wastes. Agriculture and the food processing industry are considered to be the largest contributors to the total annual production of solid wastes.
- The handling of solid wastes is a problem because most disposal methods cause harm to the environment. Both open dumps and landfills may contain toxins that seep into the soil and the water bodies and cause soil and water pollution respectively.
- The uncontrolled burning of accumulated waste creates smoke and other air pollutants that release toxic substances into the environment and cause air pollution.
- Industrial waste contains harmful chemicals, particulates (small particles) and toxic heavy metals such as lead and mercury. These toxic chemicals and heavy metals get deposited in animal tissues and harm living things along the food chain.
- For example, grass gets some toxic chemicals from the soil. Animals eat such grass and get affected by toxins.
- These animals directly or indirectly pass on these toxins to the human beings through their dairy products or meat.
- As accumulated waste decomposes, it produces a large quantity of methane gas. This is highly explosive, if not managed properly.

## **Eutrophication:**

- ◆ It is the process of depletion of oxygen from water bodies occurring either naturally or due to human activities.
- ◆ The process of eutrophication takes place due to introduction of nutrients and chemicals through discharge of domestic sewage, industrial effluents and fertilisers from agricultural fields. Algae and phytoplankton use carbon dioxide, inorganic nitrogen and phosphate from the water as food.
- ◆ They serve as food for microscopic animals (zooplankton). Small fish feed on these zooplanktons and large fish in turn consume these small fish.
- ◆ When nutrients become abundant due to waste accumulation, the growth of phytoplankton and algae increases. Consequently, the penetration of oxygen, light and heat into the water body is reduced. This causes death of most of the aquatic organisms, draining water of all its oxygen.

## **Health hazards**

## **Spread of Disease Through Contamination:**

- ◆ Several incidents around the world have demonstrated the potential harm of accumulation of waste on human health. Waste that is not properly managed is a serious health hazard.
- ◆ Waste dumped near a water source percolates through the soil into the water bodies and contaminates the water.
- ◆ Direct dumping of untreated waste in rivers, seas and lakes results in the accumulation of toxic substances in the water bodies and further in the food chain through plants and animals.
- ◆ The water logging results in breeding of mosquitoes in the stagnant water which spread diseases like malaria and chikungunya.

### **Effects of Toxic Particulate Materials**

- ◆ **Lead:** Affects blood system, causes behavioural disorders and can also cause death.
- ◆ **Cadmium:** Causes cardiovascular diseases and hypertension, kidney damage.
- ◆ **Nickel:** Causes respiratory problems, lung cancer.
- ◆ **Mercury:** Causes nerve and brain damage, kidney damage.
- ◆ **Beryllium:** -Causes berylliosis. Affects mucus membrane of eyes and lungs. Causes shortness of breath, weight loss, lung cancer and affects heart.
- ◆ **Asbestos:** Causes asbestosis, shortness of breath and lung cancer.
  - Arsenic is another chemical that has been shown to cause cancer.
  - Radioactive waste, although present in small quantities, remains externally harmful to human health for many years

### **Effect on Terrestrial Life**

- Terrestrial life includes all the organisms that live on land – human beings, plants and animals.

### **Effects on Human Beings:**

- ◆ Accumulation of solid waste looks ugly, smells foul, and attracts insects, rats and other animals that spread diseases. Burning of waste in the open dump yards causes smoke and foul smelling air.
- ◆ Sanitary landfills are not fit for human settlements because methane and carbon dioxide gases start coming up in the first two years.

### **Effects on Plants:**

- ◆ Waste accumulation has dangerous effect on plant life. Plant life is affected either by direct deposition of harmful toxins from wastes or indirectly through soil.
- ◆ The toxins cause:
  - different types of leaf injuries.
  - premature leaf fall.
  - Decrease in transpiration.
  - Reduction in the rate of photosynthesis.
  - reduction in biological nitrogen fixation.
  - dust deposited on leaves block the stomata of plants. These decrease the rate of transpiration and inhibit the absorption of nutrients from soil.
  - smoke emitted by burning of waste causes reduction in root and shoot lengths, number of leaves and number of grains per spike in case of crops like wheat.

### **Effects on Animals and Birds:**

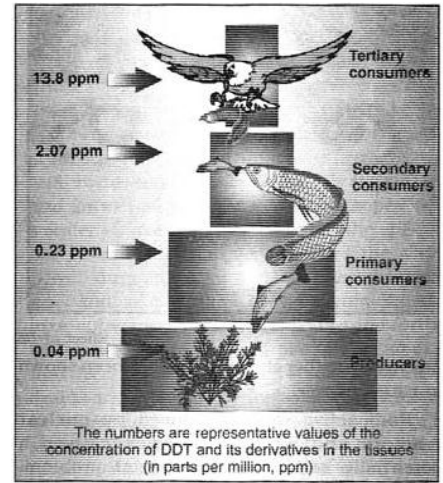
- ◆ Scavengers and stray animals like dogs, rats, pigs and cows are directly affected by waste when they feed on the waste for food. Sometimes these animals consume toxins or non-degradable substances like plastic carry bags present in the waste and die due to choking.
- ◆ The wastes consumed by animals also lead to many diseases and other problems.

### **Effect on Aquatic Life:**

- ◆ Waste accumulation can cause significant damage to aquatic life, both fresh water and marine.
- ◆ Two categories of waste that cause greatest damage to aquatic life are – pesticides, which run off agricultural lands and industrial and domestic wastes that are improperly disposed of into water bodies.

## **Biomagnification:**

- ◆ The term Biomagnification means increasing the concentration of various toxic substances along the food chain. Toxic substances at the level of primary producers get concentrated at each trophic level as they move up the food chain.
- ◆ The phenomenon of concentrated toxic deposition at the higher trophic level is known as bio-accumulation.
- ◆ A small amount of toxic constituent which is neither excreted nor metabolised, gets increased as the food chain moves upward from one trophic level to the next and the toxic constituents become concentrated.



## **Example:**

- ◆ Carelessness and the deliberate dumping of wastes and oil spills in the seas and oceans pollute water and damage beaches, Marine pollution is a great threat to sea-life (plants and animals). Oil spills decrease the penetration of light and hamper the photosynthesis process. They also retard the rate of oxygen uptake by water and adversely affect the development of marine organisms, increase their susceptibility to disease and affect their reproductive processes.
- ◆ They also lead to gastrointestinal irritation, liver and kidney problems and damage the nervous system.

## **Case study: Minamata tragedy**

- ◆ Minamata, a coastal town of Japan, had a factory of Vinyl Chloride in 1952. It used to discharge effluents with methyl mercury into the sea. Methyl mercury can break the barrier between blood cells and nerve cells. Thus, it reaches brain to cause progressive irreversible damage.
- ◆ In 1953 some fishermen fell ill in Minamata and their illness was detected to be caused by consuming fishes caught from the Minamata Bay. Fishing in Minamata Bay was banned in 1957, as mercury was identified to be the reason for toxicity. The epidemic in Minamata is now known as Minamata Disease. Mercury in Minamata contaminated and killed different sea bird species feeding on fishes.
- ◆ Mercury contamination also results from wastes of other industries like paper and pulp industry, chlorine industry, pesticide industry etc. Pesticides with mercury add a considerable proportion of mercury to natural water bodies.

# **Chapter 24: Safe Disposal of Waste**

## **Segregation**

- In industrialised countries like Japan, the waste is segregated before it is disposed of. Even in colonies various types of dustbins are used to segregate glass, metals, paper, cloth, etc., and each type is handled separately by reusing it, recycling it or disposing it in any other accepted waste disposal method.
- It should be the duty of each household to segregate domestic waste into different dustbins like biodegradable and non-biodegradable and then convert biodegradable ones into other useful products like compost or gobar gas.
- Urban residential colonies should undertake collective efforts for safe disposal of domestic waste as well as sweepings from the gardens and public parks. These sweepings can be converted into compost and used for the maintenance of these gardens and parks.

## **Dumping**

- In this method, waste materials are dumped in open low lands far away from the city. This method is not environment friendly.
- However, this is the cheapest method and does not need much planning. The open pits spoil the sight of the area and become a breeding ground for mosquitoes, flies insects etc. that are the carriers of harmful diseases.
- They give out foul odour. The burning of waste material in the open dumps pollutes the air.
- Another danger of open dumping is that rainwater could carry the harmful substances to the nearby streams, ponds or lakes and if the water seeps down it could pollute the groundwater.

## **Sanitary Landfill**

- ◆ In this method, the waste is packed and dumped daily at the site and is covered with earth to prevent insects or rodents from entering into the landfill. The waste then is subjected to bacterial decomposition. Physical, chemical and biological reactions take place generating different gases like carbon dioxide, methane, ammonia and hydrogen sulphide.
- ◆ The sanitary landfill system of disposing of waste is essentially a biological method. The waste undergoes the following five phases:
  - During the first phase of operation, aerobic bacteria deplete the available oxygen and as a result the temperature increases.
  - In the second phase, anaerobic conditions become established and hydrogen and carbon dioxide are evolved.
  - Phase three establishes population of bacteria and the beginning of methanogenic activity, i.e. production of methane from the decomposition of organic matter.
  - In the fourth phase the methanogenic activity becomes stabilized.
  - The fifth phase depletes the organic matter, and the system returns to aerobic state.

## **Advantages**

- It is free from air pollution from burning.
- The health problems are minimised since flies, rats and other pests cannot breed in the landfill because of the covered wastes as it is mostly free from fire hazards.

## **Plantation at Landfill Site**

- ◆ A vegetative cover should be provided over the landfill site in accordance with the following specifications:
  - Locally adopted non-edible perennial plants that are resistant to drought and extreme temperatures should be planted.
  - The plants grown should be such that their roots do not penetrate more than 30 cms. This condition should apply till the landfill is stabilised.
  - Selected plants should have the ability to thrive on low-nutrient soil with minimum nutrient addition.

## **Municipal Waste Management:**

### **Collection of Municipal Solid Wastes**

- ◆ The following steps should be taken by the municipal authorities:
  - Organising house-to-house collection of municipal solid wastes.
  - Devising collection of waste from slums and squatter areas or localities including hotels, restaurants, office complexes commercial areas.
  - Bio-medical wastes and industrial wastes should not be mixed with municipal solid wastes.
  - Horticultural and construction wastes should be separately collected and disposed of.
  - Waste (garbage, dry leaves) should not be burnt.
  - Stray animals should not be allowed to move around waste storage facilities.

### **Storage of Municipal Solid Waste**

- ◆ Storage facilities as following:
  - Storage facilities should be set up and established by taking into account quantities of waste generation in an area and its population density. The storage facility is to be so placed that it is accessible to users;
  - These facilities are to be so designed that wastes stored are not exposed to open atmosphere and are aesthetically acceptable and user-friendly;
  - Storage facilities or 'bins' should have 'easy to operate' design for handling, transfer and transportation of waste.
  - Manual handling of waste should be avoided.

### **Transportation of Municipal Solid Wastes:**

- ◆ Vehicles used for transportation of wastes should be covered. This prevents the wastes from being scattered. Waste should not be visible to public, nor exposed to open environment

## **Segregation of Municipal Solid Wastes:**

- The municipal authorities should undertake phased programme to ensure community participation in waste segregation.

## **Composting:**

- Composting of waste is an aerobic (in the presence of air) method of decomposing solid wastes.
- The process involves decomposition of organic waste into humus known as compost which is a good fertiliser for plants.
- The composting process produces carbon dioxide and heat which can be used for various purposes like cooking.
- The organic wastes from households are made to undergo decomposition in such a way that bacteria and other micro-organisms break them down and produce a safe, clean and soil-like material called compost.
- The micro-organisms help to stabilise the organic matter. For example, fungi starts working in the first week after dumping of the material.
- Moisture content is an important factor in aerobic composting.
- It may be necessary sometimes to add water to maintain moisture content.

## **Mechanical Method:**

- ◆ In the mechanical process, used in Bengaluru and adopted by other cities in the country.
- ◆ The waste material is placed in layers about one meter deep. The material is riot turned at all but it decomposes completely in about five months. This method Of composting is known as the Bengaluru Method.

## **Manual Method**

- ◆ In India, both the manual as well as mechanical methods of composting are used.
- ◆ In the rural areas composting refuse and night soil mixtures are dumped together which produce manure for the fields. Layers of vegetable waste and night soils are alternated in a shallow hole dug in the ground. The mixture is turned regularly for about three months to provide air to the mixture. Then the compost is left for another month without turning for the process to take effect. This method of composting is known as the Indore Method.

## **Advantages of Composting**

- ◆ The major benefits of composting are:
  - It enhances soil nutrients and water retention capacity of soils.
  - It suppresses plant diseases.
  - It rejuvenates poor soils by adding humus.
  - It absorbs odours and degrading volatile organic compounds.
  - It prevents pollution by preventing pollutants in storm water run-off from draining into water resources.

# **Chapter 25: Reduce-Reuse-Recycle**

## **Introduction:**

- In the modern industrial world, waste has become an environmental and public health hazard. Waste can be effectively managed by using the following three strategies:
  - ◆ Reducing the Waste;
  - ◆ Reusing the Waste; and
  - ◆ Recycling the Waste.

## **Reducing the waste**

- **Change of Process:** By changing a modem method to make the best use of raw materials reduces the waste

generation in industries. In zinc electroplating chlorides are used in the process instead of using the sulphate salt in order to eliminate the production of cyanides.

- **Waste Concentration:** By using scientific techniques such as precipitation and evaporation the amount of liquid waste can be reduced. Incineration can be used to get rid of inflammable wastes.
- **Segregation of Waste:** First of all, non- hazardous waste are separated from hazardous waste rather than dumping them together.

## Reusing the Waste:

- In our houses and in industries many materials are discarded as wastes. These materials have some value, for instance glass, metal pieces, rubber, wood fiber and paper products.
- In developing countries like India, some of the waste materials like old glass bottles, steel tyres, tin cans are reused. For example, shoes or chappals are made from old tyres, water bags are made from leather, lamps are made from tin cans, etc. Many waste collectors roam about in residential areas and industrial units to collect the solid wastes.
- They segregate them and supply them to specialised artisans who make utility articles from such material and make a living from their skill.
- For example, a beautiful garden (Rock Garden) has been created by Nek Chand in Chandigarh using waste products like tin cans, bottles, broken pieces of crockery, etc. Waste collectors, thus, help in making new production processes. Thus, they reduce the burden of waste disposal.
- Some solid wastes from the industry can be utilised directly. Fly ash from power plants is used as a cement substitute.
- Bricks are made from fly ash. Fly ash is also used in making of the roads and filling up low-lying areas.

## Recycle of Waste:

- Besides reusing the materials by using physical processes, we also use recycling process by treating the waste before it is used in a manufacturing process.
- **Example:** In India, we have tonnes of bagasse from sugarcane during a particular season. Bagasse can be used in the manufacture of paper pulp. This would save trees which are normally used for making paper pulp. Bagasse is also used for making packaging material of dairy

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products. Paper industry recycles pieces of wood from furniture industry, used and discarded cloth and used paper.

## Plastic:

- ◆ Plastics are recycled by plastic manufacturers. About 80 per cent of the plastic waste is recycled in India,
- ◆ Plastic is non- biodegradable. The bonds of carbon in plastic are impossible to break down through a physical or chemical process. They have to be incinerated, recycled or buried in landfills.
- ◆ The plastic bags which are extensively used in India are made from recycled plastic. The recycled plastic bags are harmful because the melting of plastic and plastic products breaks some polymer chains into smaller units which are harmful.

## Paper:

- ◆ The paper industry segregates waste paper from a huge discarded dump. Waste paper has grit, sand, ink, tar, paper clips, plastic coatings, rubber bands, etc.
- ◆ Most of the used paper is made into cardboard, paperboard, paper bags, etc. Recycled paper is used for printing only a few times because with each recycle the fibers become weak.
- ◆ The recycled product is weaker than similar product made from fresh fibers.
- ◆ Waste paper is fed on to a conveyor belt. The conveyor belt feeds the paper to a hydropulper where it is smashed in water at about 38°C.
- ◆ The force in the hydropulper is so great that the sheets of paper are rapidly broken down to a slurry.
- ◆ The fibers in the paper are retained and unacceptable materials are drained off. The pulp of waste paper is passed over a riffer system. It is then fed into another unit for the removal of dirt and tar.
- ◆ The paper slurry is thickened before it is fed into the paperboard machines.

## Government initiatives



- The Central and State Governments own, control and develop a country's forests, dams, major irrigation systems, power stations, industries, means of transportation, railways, roads, ports, etc.
- The Government is not just the protector of the country's environment but also has a major responsibility for sustaining environmental conscience.
- In India, the Ministry of Environment and Forests is the main nodal agency for generating environment consciousness and making and implementing schemes for environmental protection.
- The Government's environmental policy focuses on the following areas:
  - ◆ To check degradation of land and water through Wasteland Management and Restoration of river water quality programmes;
  - ◆ To provide for conservation of natural resources by direct action such as declaration of reserved forests, biosphere reserves, wetlands, mangroves and protection of endangered species;
  - ◆ To monitor development through Environmental Impact Assessment Studies of major project proposals; and
  - ◆ To make laws and acts for environment protection and to initiate penal measures against those who violate these laws.
- The Environment Protection Act (1986) empowers the Central government to coordinate actions of State Governments, plan and execute a nationwide programme for the prevention, control and abatement of environmental pollution.
- The government has a major role in environmental protection. It is the government's duty to find out ways and means of improving efficiency of existing technologies and introduce new eco- friendly technologies.
- Eco-friendly technology is based on renewable resources as raw material as well as energy; and transformation through highly efficient biotechnology to produce environment friendly products.
- For example, to reduce vehicular pollution in Delhi, the government initiated the development and use of CNG in automobiles instead of petrol and diesel. This has reduced air pollution in Delhi to a considerable extent.
- The government sets up various committees under the charge of experts to evaluate the impact of various projects on environment. An important issue which has been hotly debated in recent decades is the adverse effects of constructing big dams.
- Environmental activists have been urging the Government not to construct big dams. For the construction of such big dams large areas of forest and agricultural lands get submerged in water. These developments have adverse environmental and socio -economic consequences.
- Building of a dam disrupts the ecosystem of the river and destroys the aquatic as well as terrestrial life around it.
- Another serious consequence of building big dams is the large scale displacement of people from their homes. Displacement disrupts the entire life-cycle of the people. People lose their ancestral home as well as their community life and traditional occupation. They have to face the uncertainties of resettling in unfamiliar and often inhospitable locations.
- The Government has to ensure that environmental standards are strictly followed to prevent any damage to the environment caused by the construction of big dams.

## Social Initiatives

- Environmental protection is not the responsibility of the government alone. All sections of the society have to participate in this endeavour. It is ultimately the society that suffers due to environmental degradation.
- Therefore, the society has to play an important role in maintaining environmental standards in the following ways:
  - ◆ Society is made of individuals together. So it is the duty of each individual to see that his / her actions do not pollute the environment.
  - ◆ If air and water resources in an area are unfit and do not meet the acceptable standard, the people of the area can organise themselves and force the responsible agencies to take necessary action.
  - ◆ If suitable action is not forthcoming they can, under the laws of the land, file a Public Interest Litigation (PIL) and get their problems solved.
  - ◆ Groups of individuals together can make a huge difference in maintaining environmental standards. For example, group housing societies can initiate steps for waste management by making provisions for segregating wastes, taking measures for recycling wastes like making compost pits, etc.
  - ◆ They can also take measures for reducing the use of electricity and finding alternative sources of energy.
  - ◆ Air pollution, specially vehicular pollution can be minimized by adopting car pool method. This will also save huge amounts of money spent on importing petroleum from other countries.

- Community can play a significant role in environmental protection by creating awareness and educating people about the need to conserve and manage natural resources.
- Group Housing Societies and Residents Welfare Associations (RWAs) can play a significant role in conserving natural resources. For example:
  - they can make provisions for rainwater harvesting in their colonies to conserve rain water;
  - they can provide infrastructure for using solar energy in place of electricity;
  - they can make arrangements for collecting and segregating waste and turning the biodegradable waste into compost:

## Individual Initiative:

- The role of every individual in environmental protection is of great importance because if every individual contributes substantially, the effect will be visible not only at the community, city, state or national level but also at the global level.
- It can be done by following ways:
  - ◆ Use carry bags made of paper or cloth instead of polythene.
  - ◆ Help more in pollution prevention than pollution control.
  - ◆ Use eco-friendly products.
  - ◆ Cut down the use of chlorofluorocarbons (CFCs) as they destroy the ozone layer. Do not use styrofoam cups that have chlorofluorocarbon (CFC) molecules in them which destroy ozone layer.
  - ◆ Use chemicals derived from peaches and plums to clean computer chips and circuit boards instead of CFCs.
  - ◆ Use CFC-free refrigerators.
  - ◆ Save electricity by not wasting it when not required because electricity saved is electricity generated without polluting the environment.
  - ◆ Adopt and popularise renewable energy sources.
  - ◆ Promote reuse and recycling wherever possible and reduce the production of waste,
  - ◆ Use mass transport system. For short- visits use bicycle or go on foot, Decrease the use of automobiles.
  - ◆ Use rechargeable batteries. Rechargeable batteries will reduce metal pollution.
  - ◆ Use biodegradable dish washing liquid, laundry detergent and shampoo. This will reduce eutrophication of water bodies.
  - ◆ Use organic manure instead of commercial inorganic fertilizers.
  - ◆ Plant more trees, as trees can absorb toxic gases and purify the air by releasing oxygen.
  - ◆ Reduce the use of paper by using computer storage system. Recycle used paper. This would reduce demand on wood and save trees.

## Section I: [2 Marks]

### REVIEW QUESTION AND ANSWER:

**1) What do you understand by landscape spoilage?**

Ans: Landscape spoilage refers to the unpleasant looks presented by an area. It adversely affects the health of people and their living standard and environment also.

**2) “The waste accumulation damages the aesthetic of the area.” Justify by giving two reasons.**

Ans: i) When the waste is dumped in an improper way, the landscape of the area gives unpleasant look.  
ii) The uncontrolled dumping of urban waste damages the beauty of the countryside.

**3) How indiscriminate dumping of waste cause adverse effects on public health?**

Ans: i) Diseases like diarrhea, dysentery, malaria and plague are the, result of such dumping of wastes.  
ii) Areas of waste accumulation normally become the breeding place of insects, rats, flies etc.

**4) What are the main sources of Municipal Waste? Mention any four.**

Ans: Household waste, commercials, street sweeping, hotels and restaurants, clinics and dispensaries, construction and demolition, horticulture and sludge.

**5) What is open dumping?**

Ans: An open dumping is defined as a land disposal site at which solid wastes are disposed off in a manner that does not protect the environment, are susceptible to open burning and exposed to the elements, vectors, and scavenges.

**6) Mention any two health effects of open dumping.**

Ans: i) Rodents, insects and other vermin attracted to open dump sites may pose health risks. Dump sites with

scrap tires provide an ideal breeding ground for mosquitoes, which can multiply 100 times faster than normal in the warm stagnant water.

ii) If solid waste is burnt it may release harmful gases which can harm the health of nearby people.

**7) Name the gases contributing potentially to Global Warming and Climate Change phenomenon.**

Ans: Carbon dioxide, methane and nitrous oxide, CFC also.

**8) Mention any four sources of industrial waste.**

Ans: Chemical units, thermal power plants, petrochemical plants and oil refineries.

**9) What is a radioactive pollution?**

Ans: The radioactive pollution is defined as the physical pollution of air, water by the radioactive materials. The ability of certain materials to emit the proton, gamma rays and electrons by their nuclei is known as the radioactivity.

**10) What is Eutrophication?**

Ans: The process by which a body of water acquires a high concentration of nutrients, especially phosphates and nitrates is known as eutrophication.

**11) Name the diseases leads by polluted air.**

Ans: Asthma, bronchitis, emphysema and lung cancer.

**12) Mention any two harmful gases.**

Ans: Carbon dioxide and hydrogen sulphide

**13) Mention any four sources that lead to radioactive pollution.**

Ans: Nuclear power plants, nuclear weapons, transportation, disposal of nuclear waste and uranium mining.

**14) Mention any three sources of marine pollution.**

Ans: Drilling of oil, accidental and deliberate discharge of crude oil and dumping of industrial waste into ocean.

**15) What is biomagnification?**

Ans: The increasing concentration of a substance, such as toxic chemical, in the tissues of organisms at successively higher levels in a food chain. As a result of biomagnification, organisms at the top of the food chain generally suffer greater harm from persistent toxin or pollutant than those at lower level.

**16) Name the gases released in the process of mining.**

Ans: Methane and carbon monoxide.

**17) Mention any two serious effects of radiation.**

Ans: i) Radiation can lead to severe health hazards.

ii) Effects of non-ionizing radiation at low levels are certain but ionizing radiation at high levels can cause cancer and increase in chromosome damage.

**18) How does groundwater get polluted?**

Ans: Various types of chemicals are released as waste by the factories and agricultural practices. Many of these chemicals are soluble in water. The water slowly seeps down to join underground water.

**19) Name any two organisms that spread the virus among people.**

Ans: Mosquitoes and flies

**20) How do workers in matchbox factory get affected from pollution?**

Ans: Workers that work in the matchbox factory is exposed to phosphorous which causes bone diseases.

**21) What is oil spilling?**

Ans: Release of liquid petroleum/ mineral oil into the environment is called oil spilling.

**22) Mention any four sources of oil pollution.**

Ans: Oil spill, garbage dumping, accumulation of toxic materials and industrial waste.

**23) Which is the most serious pollutant in the air?**

Ans: Sulphur dioxide.

**24) Mention any two harmful effects of carbon monoxide.**

Ans: i) It affects the oxygen carrying capacity of blood.

ii) In some cases it can have negative impact on the vision also.

**25) Name a pollutant which is released by vehicles.**

Ans: Lead.

**26) What is Waste Management?**

Ans: Waste management is the collection, transport, processing, recycling or disposal of waste materials.

**27) Mention the forms of safe disposal of waste.**

Ans: Solid, liquid and gaseous.

**28) Mention any three methods of solid waste disposal.**

Ans: Segregation, dumping and composting.

**29) What is segregation?**

Ans: Segregation refers to the separation of waste into different categories of waste. Segregation depends upon the waste disposal technique. The most popular segregation is biodegradable and non-biodegradable.

**30) Mention any three forms of solid waste.**

Ans: Garbage, construction debris and industrial waste like chemicals.

**31) What is dumping?**

Ans: Dumping is an activity of depositing waste in an area.

**32) What is composting?**

Ans: Composting is a biological process in which microorganisms, mainly fungi and bacteria, convert degradable organic waste into humus-like substance.

**33) What is incineration?**

Ans: Reduction in weight and volume of solid waste disposal is called incineration.

**34) What is sewage?**

Ans: The wastewater discharged from domestic premises like residences, institutions and commercial establishments is known as sewage.

**35) What is air scrubber? Mention two methods of disposal.**

Ans: The air scrubbers are the anti-pollution devices used to trap the particles from the emissions of the gaseous waste. Air scrubber and Electrostatic precipitators.

**36) What is electrostatic precipitator?**

Ans: Electrostatic precipitators is an electric device to remove suspended impurities like dust, mist, fume etc. from the air.

**37) Name the 3Rs of waste management.**

Ans: Source Reduction, Reuse and Recycle

**38) Mention the steps involved in the process prior to recycling.**

Ans: i) Collection of waste from doorsteps, commercial places etc.  
ii) Collection of waste from community dumps.  
iii) Collection/ picking up of waste from final disposal sites.

**39) Name any four products which can be recycled and reused.**

Ans: Old copies, bottles, plates and clothes.

**40) Which is the apex administrative body in India for environmental protection?**

Ans: National Council for Environmental Policy and Planning.

**41) Mention two examples of preliminary operations.**

Ans: i) Screening and communication for the removal of debris and rags.  
ii) Grit removal for the elimination of coarse suspended matter that may cause wear or clogging of equipment.

**42) What is the principal function of primary treatment?**

Ans: To act as a precursor to secondary treatment

**43) Mention any two advantages of waste recycling.**

Ans: i) It leads to less utilization of raw materials.  
ii) It reduces environmental impacts arising from waste treatment and disposal.

**44) What is source reduction?**

Ans: Source reduction can be defined as a product that results in a net reduction in the generation of waste compared to the previous or alternate version.

**45) Mention any two devices which help in gaseous waste disposal.**

Ans: Air scrubber and electrostatic precipitators.

**46) What is pyrolysis?**

Ans: Pyrolysis or destructive distillations is a process to decompose solid waste chemically by heat in oxygen reduced atmosphere.

**47) Name any two legal provisions for waste management.**

Ans: i) Environment Protection Act (1986).  
ii) Biomedical Waste (management and handling) Rules 1998.

**48) What is the main objective of primary waste management treatment?**

Ans: To remove organic matter.

**49) Which is the most common method used for primary waste management treatment?**

Ans: Sedimentation.

**50) Name any three items which can be recycled.**

Ans: Paper, plastic and glass.

**51) "The removal/ control of nutrients in wastewater treatment are important for several reasons." Explain.**

Ans: i) Wastewater discharges to confined bodies of water cause or accelerate the process of eutrophication.  
ii) Wastewater discharges to flowing streams reduce dissolved oxygen.

## Section II: [3 Marks]

**1) Mention the waste generated by following industry units.**

**(a) Cement factories (b) Oil refineries (c) Construction units**

- Ans: a) Dust and harmful gases.  
b) Waste water, chemicals and harmful gases.  
c) Concrete, plaster, metal, wood etc.

**2) How the following pollutes the environment?**

**(a) Thermal plants (b) Nuclear plants**

- Ans: a) i) Thermal plants release harmful gases in the air which causes air pollution.  
ii) Burning of coal leaves behind ash which causes air water and soil pollution.  
b) i) Uranium and Plutonium are the raw material used in the generation of nuclear energy. These wastes remain radioactive for thousands of years.  
ii) These wastes release harmful radiations which can lead to air, water and soil pollution.

**3) How the following products add to environmental pollution?**

**(a) Styrofoam (b) Glass**

- Ans: a) i) It is not recyclable.  
ii) It releases toxic chemicals like styrene, especially when heated.  
b) i) Many organic and inorganic material are used to make glass.  
ii) Plastic, which is non-biodegradable, is also used to make glass.

**4) Distinguish between biodegradable and non- biodegradable waste.**

Ans:

<b>Biodegradable Waste</b>	<b>Non-biodegradable Waste</b>
These can be decomposed through the action of bacteria fungi and other living organism.	These cannot be decomposed through the action of bacteria, fungi and other living organisms.
These include fruit and vegetable peels, grass, wood, paper, clothes, dead remains of plants and animals etc.	These include plastic, cans, glass etc.
Most of these don't cause much harm to the environment.	Most of these are very harmful for the environment.

**5) "Plastic is a non-biodegradable product." Explain.**

- Ans: i) Plastic causes serious damage to environment during its production process and during its disposal process.  
ii) Some of the constituents of plastic, such as benzene and Vinyl chloride, are proved to cause cancer, and other gases and liquid hydrocarbons spoil earth and air.  
iii) When plastic is burn, it has its own disadvantages; as when burn, plastic releases a host of poisonous chemicals including dioxin into the air.  
iv) Plastic wastes clog the drains and thus hit especially urban sewage system. The plastic wastes being dumped into rivers, streams and sea contaminate the water, soil, marine life and also the air we breathe. Choked drains provide excellent breeding grounds for mosquitoes besides causing flooding during the rainy seasons.

**6) "Threshing of food grains generates a lot of waste." Explain.**

- Ans: i) Threshing release large amount of straw and dust in the atmosphere.  
ii) Threshers working in the fields releases harmful gases.

**7) Describe the waste generated from the mining operations.**

- Ans: i) A lot of waste is generated in the mining operations. To reach the underlying mineral deposits in earth, a lot of top soil has to be removed. In some cases the overlying rocks are removed. A lot of dust is also released into the atmosphere. Tailings are another form of waste, i.e., the waste material from the ore.  
ii) Tailing is a significant threat to the environment because it can result in the generation of acids and alkaline and alkaline drainage. Mining of uranium is risky because of random gas that is released during the mining.

**8) With reference to tanneries answer the following questions**

**(i) Define tanneries (ii) How these units pollute the environment?**

- Ans: i) Tanneries are the factories where leather is made from the skins of dead animals.  
ii) In the process of making leather, the tanneries add solid, liquid and gaseous waste. The liquid waste released by tanneries is very toxic and gives out foul smell. It can even pollute the groundwater.

**9) Mention any two ill effects of sulphur dioxide.**

- Ans: i) In air, most serious pollutant is the sulphur dioxide. Its concentration in human body causes cough, breathlessness and spasm of larynx. It also causes irritation in eyes.  
ii) It also becomes an allergic agent. When it reacts with some compounds, it makes sulphuric acid which can damage the lungs.

**10) Mention any three ill effects of radioactive substances.**

- Ans: i) The iodine may affect the White Blood Cells, bone marrow, spleen, lymph, skin cancer, sterility, eye and

damage to the lung.

- ii) The strontium has the ability to aggregate in the bones and form a bone cancer and leads to tissue degeneration.
- iii) The radioactive materials are passed through the land to water and cause an adverse effect on the aquatic animals. They reach to human through the food chain.
- iv) The nuclear power generates a lot of energy which is used to run turbines and produces electricity. The fuel and the coolant produce a large amount of pollution in the environment.

**11) Mention any three causes of marine pollution.**

- Ans: i) Drilling of oil can lead to oil spill which can destroy the marine life. Once oil is spilled it can neither be removed nor can it be contained because oil and water do not mix.
- ii) Accidental and deliberate discharge of crude oil into the ocean by cargo ships is regarded as one of the prime causes of pollution of the water body.
  - iii) Dumping of industrial wastes into ocean is another reason for marine pollution. The wastes often contain toxic materials such as mercury, dioxin and radioactive materials, which contaminate the water of ocean.
  - iv) Deposition of sediments from mining leads to ocean pollution.

**12) Mention any three effects of marine pollution.**

- Ans: i) Oil spilling is hazardous for the marine life. It seriously affects the life cycle of coral reefs thriving in the ocean. The oil spilled in the ocean could clog up the gills of fishes, thereby preventing respiration. It affects the process of photosynthesis of marine plants, since it blocks the sunlight.
- ii) Toxic waste has direct effect on marine life and affects the human beings indirectly. When the harmful toxic waste is dumped into the ocean, the fishes could consume the poisonous chemicals. When the fish is eaten by humans, this could lead to food poisoning.
  - iii) Carbon dioxide is hazardous for marine life including coral reefs and free-swimming algae.
  - iv) Plastics dumped into ocean can affect the marine life seriously. Plastic items such as bottles and bags could choke and suffocate the sea animals, as they eat them thinking that they are food. Plastics are known to be a major cause for the death of turtles, as they swallow the floating bags, mistaking them for jelly fish.
  - v) Dumping of industrial wastes such as pesticides, especially DDT can accumulate in the fatty tissue of animals. This could lead to the failure in the reproductive system of mammals and birds.

**13) Mention any three effects of solid waste.**

- Ans: i) Numerous insects, bacteria and virus grow on the routing waste which are capable of spreading several diseases like diarrhea, cholera etc.
- ii) Mosquitoes are known for spreading malaria.
  - iii) Flies carry the virus and spread it in the adjoining areas. People fall sick and start vomiting.

**14) "Terrestrial life is affected with the waste." Explain.**

- Ans: Pollutants of waste enter the environment and become a part of food chain which accumulates in the bodies of organisms at different levels. For example, insecticides and pesticides used by the farmer mix with the water. Animals drinking that water may get infected. Plants growing in that area may absorb these chemicals and get infected. Humans consuming these plants may also get infected.

**15) Explain the effects of agricultural waste.**

- Ans: i) Agricultural activities generate a lot of waste. Although most of agricultural waste is biodegradable, in most cases it is not handled properly and affects environment adversely.
- ii) After harvesting, the crop residue is the major agricultural waste. Farmers often burn this waste in the fields. It kills the much needed organic life in the soil.
  - iii) After burning, the ash floats in air and affects the health of people. Activity of threshing also releases a lot of waste in the form of straw. Its particles remain suspended in air which affects the health of people, especially the asthmatic patients. Many farmers are involved in dairy farming which makes the air stinking.

**16) Mention any three effects of mining and industrial waste.**

- Ans: i) Workers are infected with silicosis, a lung disease.
- ii) People who work in the deep mines inhale the fine coal dust. It leads to a disease called black lungs. Many gases are also released in the process of mining like methane and carbon monoxide.
  - iii) Workers that work in the matchbox factory are exposed to phosphorus which causes bone diseases.

**17) What is recycling?**

- Ans: Recycling involves the collection of used and discarded materials, processing these materials and making them into new products. It reduces the amount of waste that is thrown into the community dustbins thereby making the environment cleaner and the air fresher to breathe.

**18) Mention some benefits of composting.**

- Ans: i) It supplies essential elements needed by the plants.
- ii) It helps reduce the adverse effects of excessive alkalinity, acidity or the excessive use of chemical fertilizer.

- iii) It makes soil easier to cultivate.
- iv) It helps keep the soil cool in summer and warm in winter. It aids in preventing soil erosion by keeping the soil covered.
- v) It helps in controlling the growth of weeds in the garden.

**19) What is the role of government in saving environment?**

- Ans: i) Instead of building large multi-purpose projects the government should opt for small dams. This will help in protecting the forest as lot of forested land is submerged in water because of dam.
- ii) The government should also go for the renewable sources of energy like wind, solar and biomass energy. These are eco-friendly sources of energy whereas burning of fossil fuels like coal and petroleum pollutes the environment.
  - iii) Government should educate the people through publications, films and other materials aiming at increasing awareness of environmental problems.
  - iv) Government should frame strict laws and should execute them properly.

**20) What is the role of individual in saving environment?**

- Ans: i) Everybody should follow the techniques of simple living such as the use of solar cooker and minimum use of cooking gas; closing all taps when not in use; switching off electric appliances when not in use.
- ii) The vehicles should be regularly checked so that minimum smoke emits from them.

**21) Give a brief description of various legal provisions of waste management.**

- Ans: i) **Environment Protection Act 1986:** This act provides for the protection and improvement of environment and other connected matters.
- ii) **Biomedical Waste (management and handling) Rules, 1998:** The Central Govt. has made the Biomedical Waste Rules to safeguard the public and health care workers from the risk arising from Biomedical Waste.
  - iii) **The Recycled Plastics Manufacture and Usage Rules, 1999:** The objective of these rules is to regulate the manufacture and use of recycled plastics, carry bags and containers. As per these rules the thickness of the carry bags made of virgin plastics or recycled plastics cannot be less than 20 microns. Carry bags and containers made of virgin plastic are to be in natural shade or white.
  - iv) **Motor Vehicles Act, 1989:** The Act lays down the responsibilities of the driver of the vehicles like license, insurance, maintenance of vehicles in proper conditions. The Act also empowers the centre and state governments to make rules as and when needed.

**MISCELLEOUS QUESTIONS / HOME WORK**

**Need for Management of Waste**

- 1) Name three diseases which occur because of waster accumulation on land.
- 2) Name two diseases which are spread through pet animals.
- 3) Name three water-borne diseases.
- 4) Name three water-borne diseases.
- 5) What are the three R's of waste management?
- 6) What is Greenhouse Effect? How is it related to Global Warming?
- 7) State the consequences of Global Warming.
- 8) What role does the ozone layer play to protect life on earth?
- 9) What is Acid Rain? How is it caused?
- 10) Explain the need for management of waste.

**Impact of Waste Accumulation**

- 1) What impact does the decomposition of waste in the open areas have on human health?
- 2) Why are radioactive wastes more hazardous than other wastes?
- 3) Name the disease caused by mercury contamination in Japan.
- 4) Name three monuments affected by acid rain.
- 5) What is known as eutrophication?
- 6) Explain the impact of waste accumulation on human health.
- 7) What is acid rain?
- 8) Why is the handling of solid wastes a major problem?
- 9) Explain how eutrophication affects aquatic life.
- 10) What is biomagnification? What can be its effects on human beings?
- 11) What is known as the Minamata Disease? What caused it?

**Safe Disposal of Waste**

- 1) Name two useful products which can be made from biodegradable domestic waste.
- 2) What service is indirectly done by the rag-pickers for the disposal of waste?
- 3) Explain the role of segregation of waste in the safe disposal of waste.
- 4) What is a sanitary landfill?
- 5) How is waste disposed of in a sanitary landfill?
- 6) What steps should be taken by the municipal authorities for the safe disposal of solid waste?
- 7) How is compost made?
- 8) Give three advantages of using compost.

### Reduce-Reuse-Recycle

- 1) What are the three R's of waste management?
- 2) Name the processes involved in reducing the waste.
- 3) Give one example of reusing of waste.
- 4) What do you mean by recycling of waste?
- 5) Explain clearly how waste can be reduced by changing the process of production.
- 6) Give an example of reusing waste effectively.
- 7) Explain how recycling of waste to produce paper can reduce deforestation.
- 8) Name the sugarcane waste which can be recycled into useful products.
- 9) Why should we avoid using polythene carry bags and styrofoam cups?
- 10) Explain the role of government in waste management.
- 11) Give three examples to show how social initiatives can help minimise the use of resources.
- 12) What can an individual do to reduce waste at home as well as in the office?
- 13) What harm is done to the environment by building big dams?

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#### PREVIOUS YEARS BOARD QUESTIONS:

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|-------|---|--|--------|
| 1) a) | i) State the main objective of the treatment of gaseous waste.        |  |        |
|       | ii) Name two common diseases caused as a result of gaseous pollution. |  |        |
|       | What was the cause of the following?                                  |  |        |
|       | i) The Bhopal Tragedy.  |  |        |
|       | ii) The Minamata Disease.   |  |        |
|       | iii) The Chernobyl Disaster.  |  | [2013] |
| 2) a) | How does accumulation affect the environment?                         |  |        |
| b)    | What is acid rain? Mention two of its effects.                        |  | [2014] |

**BEST WISHES FOR THE  
BOARD EXAMINATION**