

13 Mineral and Energy Resources

Fastrack Revision

► Mineral and Energy Resources

- Any item which is useful to humans or is useful in utility is called resource, such as mineral oil, coal, minerals, natural vegetation etc. Thus, resource refers to the availability of everything available in the environment that is used to meet human needs.
- Minerals are an integrated part of human life. They are the base of industrial development. They are used in day-to-day life. Means of transport, machine tools and instruments are made from minerals. Countless substances are made of gold, silver and diamond, which we get from minerals. Without iron and coal no industrial progress is possible.
- Peninsular India is very rich in minerals and has reserves of valuable minerals. These minerals are associated with igneous rocks and metamorphic rocks.

► Meaning and Characteristics of Minerals

- According to geologists, minerals are naturally occurring homogeneous elements which have a definite internal structure. Minerals are compound forms of certain elements. More than two thousand minerals have been identified so far.
- Distribution of minerals on earth's surface is uneven.
- Minerals are found in the form of hardest diamond to softest talc.
- Some rocks are made up of only one and some are made of many minerals.
- Good quality minerals are less in quantity while low quality minerals are found in large quantities.
- Due to physical and chemical conditions, minerals have various colours, hardness, lustre, density and crystals.
- Minerals are obtained from ore.
- Minerals in igneous and metamorphic rocks are found in molten and gaseous state.
- Many minerals are found in sedimentary rock beds.
- The decomposition of surface rocks produces minerals.
- Large quantities of minerals are found in oceanic water.

► Classification of Minerals

Classification of minerals is done on the basis of their physical and chemical properties. They are classified in the following ways:

- **Metallic Minerals:** They are rich in metals. They are of two types:
 - **Ferrous Minerals:** They have high and rich iron contents, such as iron ore, manganese, nickel, cobalt.
 - **Non-ferrous Minerals:** They do not have iron content but have other metals, such as copper, lead, tin and bauxite.

► **Non-metallic Minerals:** They have no metallic substance. They are of two types:

- **Organic Minerals:** They are made of organic substances which are generated from buried animals and dead plants, such as fossil or mineral fuels like coal, petroleum, natural gas.
- **Inorganic Minerals:** They are composed of inorganic substances, such as mica, salt, potash, limestone, marble and graphite. Coal, petroleum and natural gas are called as energy minerals and gold, silver, platinum are known as precious metals.

► Distribution of Minerals in India

- Most metallic minerals in India are found in the peninsular of India. River valleys of Damodar, Mahanadi and Godavari etc., have over ninety-seven per cent of coal reserves.
- Assam, Gujarat and Mumbai High have crude petroleum reserves. Recently rich petroleum reserves have been found in Godavari, Krishna and Kaveri basins. There are mainly three mineral belts in India:
 - **North-Eastern Plateau Region:** The regions of Jharkhand, Odisha, West Bengal and Chhattisgarh are included in it. Coal, manganese, iron ore, bauxite are found in this belt.
 - **South-Western Plateau Region:** This region extends over Karnataka, Goa, Tamil Nadu and Kerala. Ferrous metals, bauxite, manganese and limestone are concentrated in this belt.
- **North-Western Region**
 - This belt extends to Aravalli range of Rajasthan and parts of Gujarat. In this area, major minerals are copper and zinc. Building stones such as sandstone, granite, marble, gypsum are found in abundance in the region of Rajasthan.
 - Gujarat has rich petroleum deposits. Salt is also produced in Gujarat and Rajasthan. Eastern and Western parts of Himalayas are also rich in some mineral deposits such as copper, lead, zinc, cobalt, tungsten. Assam has mineral oil deposits.

► Distribution of Metallic Minerals

- Ferrous minerals account for three-fourth of total production of metallic minerals. Iron ore, copper, bauxite and manganese are ferrous minerals which provide strong base for development of metallurgical industries.
- **Iron Ore:** Iron ore is the base mineral as it is used in most of the activities. Its main types are:
 - **Magnetite:** This black coloured mineral has more

than seventy-two per cent of iron. It is obtained from igneous or metamorphic rocks. It is the best kind of iron ore.

- **Hematite:** This red and slaty coloured mineral has sixty per cent to seventy-two per cent of iron. It is abundantly found in sedimentary rocks. As it is found in large quantity, therefore it also has great commercial utility.

- **Limonite:** This yellow and brownish coloured mineral has forty per cent to sixty per cent of iron. Its storage is found in sedimentary rocks. It is exploited in very less quantity.

- **Siderite:** This ash coloured mineral has twenty per cent to thirty per cent of iron particles, meaning it has the least iron. It is the carbonate form of iron.

► Reserves of Iron Ore in India

- The distribution of iron ore is uneven in the world. China, Brazil, Australia, India and Russia are the main countries which produce iron ore. Two superior qualities of iron ore, magnetite and hematite, are found in India. Iron ore mines in India are found near the coal fields of northeast plateau region.

- **Odisha** has large iron ore reserves. Sundergarh (Bonal), Mayurbhauj (Badampahar) and Kiruburu are important mines. **Jharkhand** is the region where oldest mines in India are found. Poorvi Singhbhum and Pashchimi Singhbhum have the main belt of iron ore. **Chhattisgarh** is also rich in iron ore and the mines are found in Durg, Dantewada and Bailadila. Iron ore deposits occur in Ballari, Chikmagalur, Chitradurga and Tumkur districts of Karnataka state.

- **Maharashtra's** important iron ore mines are located in Chandrapur, Bhandara and Ratnagiri districts.

- Kurnool, Cuddapah and Anantapur districts are important regions in **Andhra Pradesh** where iron ore is found. In **Telangana**, Karimnagar and Warangal are important sites. Salem and Nilgiri districts of **Tamil Nadu** and **Goa** also have iron ore in their regions.

- **Copper:** Copper is found in the internal part of earth as ore. It is obtained from igneous and metamorphic rocks. Then copper ore is rectified. It is mostly used in electric bulbs, motors, watches, engines, computers, radios, wires, transformers and generators. Important states where copper ore is found are:

- Jharkhand (Singhbhum district), Madhya Pradesh (Balaghat district), Rajasthan (Jhunjhunu and Alwar district) and Andhra Pradesh (Guntur district) and Chitradurga and Hassan districts in Karnataka.

- **Bauxite:** This is an ore which is used in manufacturing of aluminium. It is associated with laterite rocks and is found in hilly regions of peninsular India and some coastal areas. **Odisha** is the largest producer of bauxite. Kalahandi and Sambalpur are the main districts of this ore. Lohardaga in **Jharkhand** has rich deposits. Bhavnagar and Jamnagar in **Gujarat** have deposits of bauxite.

- In **Chhattisgarh**, Amarkantak plateau has rich deposits. **Madhya Pradesh (Jabalpur and Balaghat)** and **Maharashtra (Kolaba, Thane, Ratnagiri, Satara, Pune and Kolhapur)** also have bauxite deposits. **Tamil Nadu, Goa and Karnataka** are minor producers of this ore.

- **Manganese:** It is very important mineral metal. India ranks third in the production of manganese ore in the world, next only to Russia and South Africa. About one-third of the total production in India is exported. Manganese ore forms an important ingredient in the manufacture of iron and steel. It is also used in manufacture of dry batteries, in photography, leather and match industry. About eighty-five per cent of total manganese consumption in India is used by metallurgical industries.

- **Odisha** is the leading manganese producer in India. In **Karnataka**, mines are located in Dharwar, Ballari, Belgaum, North Canara and Chikmagalur.

► Distribution of Non-Metallic Minerals

- Minerals that do not contain metals are called non-metallic minerals. Some non-metallic minerals found in India are mica, limestone, dolomite and phosphate.

- **Mica:** Mica is found in form of plates or in leaves. It can be easily split into sheets. It can be transparent but can also be black, green, red, yellow and brown in colour. It is used in electrical industry, electronics industry, radio and telephone. It is also used in medicine manufacturing. It is mined from the north banks of Chota Nagpur plateau, Koderma-Hazaribagh belt in **Bihar** and **Jharkhand**, Ajmer region of **Rajasthan** and Nellore districts of **Karnataka** are important sites mica production. **Colombatore, Madurai and Kanyakumari** in **Tamil Nadu**, **Ratnagiri** in **Maharashtra**, **Alleppey** in **Kerala**, **Purulia** and **Bankura** in **West Bengal** are also known for mica deposits.

► Salt

- It is common salt or sodium chloride (NaCl), which is a substance found dissolved in sea water and as rock salt (halite) in large deposits and salt domes. It is used in many industrial processes such as manufacturing of polyvinyl chloride, plastics, paper pulp etc. In India, **Rajasthan** and **Gujarat** regions are good source of salt.

► Energy Resources

- There are several sources of energy. Mineral sources such as coal, petroleum, natural gas and radioactive minerals are all non-renewable or exhaustible resources. On the other hand, running water, sun, wind, tides, hot springs and biomass are all inexhaustible or renewable sources of energy. They are also pollution-free.

- **Conventional Energy Sources:** These sources of energy have been used since ancient times. Traditional means include wood, dung, coal, natural gas, petroleum, hydropower and thermal power. Many energy sources generate power.

- **Coal:** Coal is the main source of mechanical energy. In present times, nearly twenty-eight per cent of energy is obtained by coal in the world. Coal is known as the creator of Industrial Revolution. Due to its utility it is called 'Black Gold'. In Anthracite coal, there is ninety to ninety-five per cent carbon.

- In India, coal is found in two rock belts: Gondwana deposits and tertiary coal deposits. Gondwana region is mainly located in peninsular plateau.

- ▶ **West Bengal, Bihar, Jharkhand, Odisha, Madhya Pradesh, Andhra Pradesh and Maharashtra** fall in this region. About 80% of coal found in India is bituminous coal of non-coking grade.
- ▶ The rocky coalfields of Tertiary order include the states of **Meghalaya, Assam, Arunachal Pradesh, Nagaland, Tamil Nadu and Rajasthan**.
- ▶ **Petroleum:** Petroleum is a kind of rock oil. It is composed of bio-organisms. It is often called 'liquid gold' because it has great value in the present times. Crude petroleum is a mixture of combustible hydrocarbons in solid, liquid and gaseous forms.
- ▶ Petrol, kerosene, diesel, detergents, synthetic fibres, plastics and cosmetics are important products derived from petroleum. Petroleum is found with water and natural gas. It is lighter than water and floats on it. The natural gas exists on petroleum. Petroleum occurs in anticlines and fault traps. In India, it is found in sedimentary rock formation.
- ▶ Most of such areas lie in **Assam, Gujarat** and offshore areas along the western coast. The entire production of India till today comes from **Assam belt, Gujarat-Cambay region and Mumbai High**.
- ▶ Mumbai High is the largest producer of petroleum in the country. It was discovered in 1973 and production started in 1976. Recently, petroleum reserves have been discovered in **Rajasthan** near Bikaner, Barmer and Jaisalmer.
- ▶ Gas has been discovered along the east coast of **Godavari and Krishna deltas**. The prospective areas lie in the **Bay of Bengal**, which covers the coastline along the states of **West Bengal, Odisha, Andhra Pradesh, Tamil Nadu** and the **Andaman and Nicobar Islands**.
- ▶ **Natural Gas**
 - ▶ It is an important source of energy. It is used as an industrial raw material for the petrochemical industry. It is considered environmentally friendly due to low emission of carbon dioxide. Natural gas deposits are found in the **Krishna-Godavari basin, Gulf of Khambhat, Mumbai and Andaman and Nicobar Islands**.
 - ▶ Gas Authority of India Limited was set up in 1984 as a public sector undertaking to transport and market natural gas. Exclusive reserves of natural gas have been located along the eastern coast (Tamil Nadu, Odisha and Andhra Pradesh), as well as Tripura, Rajasthan and offshore wells in Gujarat and Maharashtra.
- ▶ **Non-conventional Energy Sources**
 - ▶ Conventional sources of energy like coal, petroleum, natural gas are likely to be exhausted in near future. The hydel power alone cannot meet the demand of electricity for the future. So, there is need to find alternative sources of power. Sun, wind, tides, biological waste and hot springs are such sources which can be developed as alternative sources of energy. They are known as non-conventional sources of energy. These sources are renewable and also pollution-free. Some of non-conventional sources are discussed as follows:
 - ▶ **Solar Energy:** For the planet earth, the sun is the primary source of all energy. It is the most vital, abundant and direct source of energy. India lies in the tropical zone, so it has plenty of sun shine for long hours of the day. Solar energy is tapped through Solar Photo

Voltaic (SPV) cells. The thermal heating system can be used for water heating, cooking and drying food grains. It can be developed in almost every part of country but more so in hot, dry and cloud-free areas like Rajasthan. It is 7% more effective than coal and oil based plants and 10% more effective than nuclear plants.

- ▶ **Wind Energy:** Wind can be used as a source of energy in those regions where strong and constant winds blow throughout the year. Wind energy can be used for pumping water for irrigation and also for generating electricity. India has about 45,000 MW estimated wind power potential. Prospective sites for generating electricity have been located in **Tamil Nadu, Gujarat, Andhra Pradesh, Karnataka, Kerala and Rajasthan**. The potential that can be tapped at present is limited to around 1300 MW. But at present 2490 MW is generated through wind which places India in the fifth position globally after Germany, USA, Denmark and Spain.
- ▶ **Tidal and Wave Energy:** High tidal waves generate energy. Some of the important sites identified for generating tidal energy are located in the Gulf of Kutch and Cambay in **Gujarat** and coast of **Kerala**. A plant of 150 MW capacity has been installed on the Kerala coast.
- ▶ **Geothermal Energy:** The potential of geothermal power is very limited in India. Important sites selected for generating geothermal power are situated in **Himachal Pradesh and Ladakh**.

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The first successful (1890) attempt to tap the underground heat was made in the city of Boise, Idaho (U.S.A.), where a hot water pipe network was built to give heat to the surrounding buildings. This plant is still working.



- ▶ **Biogas:** Biogas is obtained by using animal waste like cow dung. It is widely used in rural areas, mainly as domestic fuel. Efforts are being made to popularise biogas plants in the country. Urban and industrial waste is another source of biological energy in big cities and industrial centres. These materials can be used for generating electricity or biogas. The work in this direction is still in its initial stage. Such plants have been installed in **Delhi** and some other cities in India.
- ▶ **Nuclear Energy:** Nuclear energy is obtained from uranium and thorium. This source of energy is renewable in nature. It is environment friendly and cheaper energy sources. This source of energy is a viable source.
- ▶ Uranium deposits in India are found in Dharwar rock system. Important regions are **Jharkhand, Rajasthan, Chhattisgarh, Maharashtra and Himachal Pradesh**. Thorium deposits are found from monazite and ilmenite in the beach sands along the coasts of **Kerala and Tamil Nadu**. Its deposits are also found near Vishakhapatnam in **Andhra Pradesh** and Mahanadi river delta in **Odisha**.
- ▶ Important nuclear power projects are Tarapur in **Maharashtra**, Rawatbhata in **Rajasthan**, Kalpakkam in **Tamil Nadu**, Narora in **Uttar Pradesh**, Kalga in **Karnataka** and Kakrapar in **Gujarat**.



► **Problems of Mining Industry:**

► India is rich in mineral resources. The mining industry is facing a number of problems. Some of the problems are as follows:

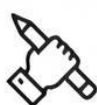
- Ill-defined government policy
- Obsolete technology
- Inadequate transport facilities
- Inadequate exploration and prospecting of minerals
- Inadequacy of funds
- Lack of awareness about conservation
- Export of mineral ores
- Strikes and naxalites
- Mining as a hazardous industry. Hundreds of miners are killed every year.

► **Conservation of Minerals Resources**

► Minerals are the most valuable resources which are imperative for the economic development of the nation. A judicious utilisation of mineral resources

is necessary to meet the growing demands of our population. Some steps which can go a long way in the conservation of mineral resources are as:

- Judicious use of available minerals
- Efficient technology for processing and consumption
- Research should be done to find alternatives to minerals
- Development of Infrastructure
- Location of industries near mining sites
- Scrap should be recycled
- Students should become aware about exhaustible nature of minerals
- Emphasis should be on sustainable mining
- Miners should be trained properly in new technology of mining
- Research and development should be promoted in the field of minerals.



Practice Exercise



Multiple Choice Questions

Q 1. High quality mica is produced in lower plateau in Jharkhand.

- a. Malwa
- b. Hazaribagh
- c. Chota Nagpur
- d. Bastar

Q 2. The largest coal field containing Gondwana coal in India is:

- a. Raniganj
- b. Singrauli
- c. Bokaro
- d. Jharia

Q 3. Gondwana coal fields are located mainly in the valley.

- a. Ganga
- b. Damodar
- c. Chambal
- d. Narmada

Q 4. The Oil and Natural Gas Commission was set up in

- a. 1981
- b. 1947
- c. 1956
- d. 1921

Q 5. Which of these states have high potential for development of solar energy?

- a. Gujarat
- b. Assam
- c. Arunachal Pradesh
- d. Bihar

Q 6. Which of the following oil refineries are correctly arranged from North to South?

- a. Visakhapatnam, Chennai, Nagapattinam, Haldia
- b. Haldia, Chennai, Nagapattinam, Visakhapatnam
- c. Haldia, Visakhapatnam, Chennai, Nagapattinam
- d. Visakhapatnam, Haldia, Chennai, Nagapattinam

Q 7. The North-Eastern plateau region consists of mainly which of the following minerals?

- 1. Iron-ore
- 2. Coal
- 3. Zinc
- 4. Granite

Codes:

- a. 1 and 2
- b. 2 and 3
- c. 3 and 4
- d. 1 and 3

Q 8. Which of the following is a metallic mineral?

- a. Coal
- b. Bauxite
- c. Mica
- d. Graphite

Q 9. Given below are the steps to generate geothermal energy. Arrange the following in correct sequence:

- (i) It is so hot that when it rises to the earth's surface, it turns into steam.
- (ii) Groundwater in such areas (where the geothermal gradient is high) absorbs heat from the rocks and becomes hot.
- (iii) This steam is used to drive turbines and generate electricity.
- (iv) Geothermal energy exists because the earth grows progressively hotter with increasing depth.

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- a. (iv) (ii) (i) (iii)
- b. (ii) (i) (iv) (iii)
- c. (i) (iv) (iii) (ii)
- d. (iii) (ii) (iv) (i)

Q 10. Match the following:

| Resources (Column-I) | Examples (Column-II) |
|----------------------------|-------------------------------|
| A. Renewable Resources | 1. Forests and Wildlife |
| B. Non-Renewable Resources | 2. The oceanic resources |
| C. National Resources | 3. Roads, canals and railways |
| D. International Resources | 4. Minerals and fossil fuels. |



Codes:

| A | B | C | D | A | B | C | D |
|------|---|---|---|------|---|---|---|
| a. 1 | 2 | 3 | 4 | b. 4 | 3 | 2 | 1 |
| c. 1 | 4 | 3 | 2 | d. 3 | 1 | 4 | 2 |

Q 11. Minerals need to be conserved because

- I. they are renewable.
- II. they are depleting rapidly.
- III. they are needed for country's industrial development.
- IV. their formation is very fast.

Codes:

- | | |
|---------------|-----------------|
| a. I and II | b. II and III |
| c. III and IV | d. All of these |

Q 12. Consider the following statements and choose the correct answer with the help of given options:

Statement I: Mineral resources are finite and non-renewable.

Statement II: The geological processes of mineral formation are so slow that the rate of replenishment are infinitely small in composition to the present rate of consumption.

- a. Both the statements are true, statement II does not explain statement I correctly.
- b. Both the statements are true and statement II correctly explains the statement I.
- c. Both statement I and II are false.
- d. Statement I is true and statement II is false.



Assertion & Reason Type Questions

Directions (Q. Nos. 13-14): In the questions given below, there are two statements marked as Assertion (A) and Reason (R). Read the statement and choose the correct option:

- a. Both (A) and (R) are true and (R) is the correct explanation of (A).
- b. Both (A) and (R) are true, but (R) is not the correct explanation of (A).
- c. (A) is true, but (R) is false.
- d. (A) is false, but (R) is true.

Q 13. Assertion (A): Ferrous minerals are rich in iron content.

Reason (R): Distribution of minerals is ubiquitous (even) in nature.

Q 14. Assertion (A): Solar energy has some relative advantages over all other non-renewable energy sources.

Reason (R): It is cost competitive, environment friendly and easy to construct.

Answers

- | | | | | |
|---------|---------|---------|---------|---------|
| 1. (b) | 2. (d) | 3. (b) | 4. (c) | 5. (a) |
| 6. (c) | 7. (a) | 8. (b) | 9. (a) | 10. (c) |
| 11. (b) | 12. (b) | 13. (c) | 14. (a) | |



Passage Based Questions

Passage 1

Read the passage given below and answer the questions that follow by choosing the most appropriate option:

Metallic minerals are the sources of metals. Iron ore, copper, gold and other metals are included in this category. Metallic minerals are further divided into ferrous and non-ferrous metallic minerals. Ferrous, as you know, refers to iron. All those minerals which have iron content are ferrous such as iron-ore itself and those which do not have iron content are non-ferrous such as copper, bauxite, etc. Non-metallic minerals are either organic in origin such as fossil fuels also known as mineral fuels, which are derived from the buried animal and plant life such as coal and petroleum. Other type of non-metallic minerals are inorganic in origin such as mica, limestone and graphite. Minerals have certain characteristics. These are unevenly distributed over space. There is an inverse relationship in quality and quantity of minerals *i.e.*, good quality minerals are less in quantity as compared to low quality minerals. The third main characteristic is that all minerals are exhaustible over time. These take long to develop geologically and they cannot be replenished immediately at the time of need. Thus, they have to be conserved and not misused as they do not have the second crop. Most of the metallic minerals in India occur in the peninsular plateau region in the old crystalline rocks. Over 97 per cent of coal reserves occur in the valleys of Damodar, Son, Mahanadi and Godavari. Petroleum reserves are located in the sedimentary basins of Assam, Gujarat and Mumbai High *i.e.*, off-shore region in the Arabian Sea. New reserves have been located in the Krishna-Godavari and Kaveri basins. Most of the major mineral resources occur to the East of a line linking Mangaluru and Kanpur.

Q 1. Which of the following is a metallic mineral?

- | | |
|------------|-----------------|
| a. Copper | b. Silver |
| c. Bauxite | d. All of these |



Q 2. Which of the following is a characteristic of minerals?

- a. Unevenly distribution b. High cost
c. Lustrous and brittle d. All of these

Q 3. Which of the following is an inorganic mineral?

- a. Mica b. Limestone
c. Graphite d. All of these

Q 4. Which of the following is an off-shore petroleum refinery?

- a. Mumbai High b. Barauni
c. Ankaleshwar d. All of these

Answers

1. (d) 2. (a) 3. (d) 4. (a)

Passage 2

Read the passage given below and answer the questions that follow:

India is endowed with fairly abundant resource of iron ore. It has the largest reserve of iron ore in Asia. The two main types of ore found in the country are haematite and magnetite. It has great demand in international market due to its superior quality. The iron ore mines occur in close proximity to the coal fields in the North-Eastern plateau region of the country which adds to their advantage. About 95 percent of total reserves of iron ore is located in the states of Odisha, Jharkhand, Chhattisgarh, Karnataka, Goa, Telangana, Andhra Pradesh and Tamil Nadu. In Odisha, iron ore occurs in a series of hill ranges in Sundergarh, Mayurbhanj and Keonjhar. The important mines are Gorumahisani, Sulaipet, Badampahar (Mayurbhanj), Kiriburu (Kendujhar) and Bonai (Sundergarh). Jharkhand has some of the oldest iron ore mines and most of the iron and steel plants are located around them. Most of the important mines such as Noamundi and Gua are located in Poorvi and Pashchimi Singhbhum districts. This belt further extends to Durg, Dantewada and Bailadila. Dalli, and Rajhara in Durg are the important mines of iron-ore in the country. In Karnataka, iron ore deposits occur in Sandur-Hospet area of Ballari district, Baba Budan hills and Kudremukh in Chikkamagaluru district and parts of Shivamogga, Chitradurga and Tumakur districts. The districts of Chandrapur, Bhandara and Ratnagiri in Maharashtra, Karimnagar and Warangal district of Telangana, Kurnool, Cuddapah and Anantapur districts of Andhra Pradesh, Salem and Nilgiri districts of Tamil Nadu are other iron mining regions. Goa has also emerged as an important

producer of iron ore. Manganese is an important raw material for smelting of iron ore and also used for manufacturing ferro alloys. Manganese deposits are found in almost all geological formations. However, it is mainly associated with Dharwar system. Odisha is the leading producer of manganese. Major mines in Odisha are located in the central part of the iron ore belt of India, particularly in Bonai, Kendujhar, Sundergarh, Gangpur, Koraput, Kalahandi and Bolangir.

Q 1. Which mineral are found in Mayurbhanj Hills?

Ans. Iron ore is found in Mayurbhanj Hills.

Q 2. In which rocks are manganese mineral found?

Ans. Manganese mineral is found in Dharwar rocks.

Q 3. Where are Baba Budan hills located? Explain the different ores of iron.

Ans. Baba Budan Hills are located in Karnataka. Different ores of iron are haematite, magnetite, limonite and siderite.



Very Short Answer Type Questions

Q 1. Why are mineral fuels required?

Ans. Mineral fuels are essential for generation of power, agriculture, industry, transport and other sectors of the economy.

Q 2. Why is petroleum referred to as liquid gold?

Ans. Petroleum is referred to as liquid gold because of its scarcity and diversified uses.

Q 3. Define the term 'Mineral Resources.'

Ans. Mineral resources can be defined as homogeneous, naturally occurring, inorganic materials that are of economic interest in or on the crust of the Earth.

Q 4. Define metallic minerals.

Ans. Metallic minerals are rich in metals. For example, copper, iron-ore, bauxite, gold, manganese, etc.

Q 5. Define non-metallic minerals.

Ans. Minerals that do not contain metals are called non-metallic minerals. They are inorganic in origin and are derived from the buried animal and plant life.

Q 6. Define ferrous minerals.

Ans. Ferrous minerals are minerals which contain iron. They have very small amount of other metals added.

Q 7. Name any two important oil producing areas in India.

Ans. Digboi and Naharkatiya in Assam are important oil producing areas in India.

Q 8. Name the major oilfields found in India.

Ans. The major oilfields found in India are Ankaleshwar, Kalol, Mehsana, Nawagam, Kosamba, Lunej and Mumbai High.

Q 9. What types of oil refineries are found in India?

Ans. (i) Field based (ii) Market based

Q 10. Where are most of the metallic minerals found in India?

Ans. Most of the metallic minerals in India are found in the peninsular plateau region.

Q 11. Name the minerals found in the South-Western Plateau region?

Ans. Bauxite, iron-ore, manganese and limestone are found in the South-Western plateau region.

Q 12. Why should the export of minerals be reduced?

Ans. Export of minerals should be reduced so that the existing reserve may be used for a longer period.

Q 13. How can metallic minerals be conserved?

Ans. Metallic minerals can be conserved by recycling.

Q 14. Name any two alternate energy sources that can be used to conserve mineral resources.

Ans. The alternate energy sources that can be used to conserve mineral resources are solar energy, wind, wave and geothermal energy.

Q 15. Mention any four features of non-metallic minerals in India.

Ans. The main features of non-metallic minerals in India are: good electric and thermal conductivity, luster, rigour and malleability.

Q 16. Mention any four features of 'Geothermal energy' in India.

Ans. The main features of Geothermal energy in India are:

- (i) Huge potential
- (ii) Reliable
- (iii) Environmentally friendly
- (iv) No fuel required

Q 17. Mention any four features of 'Solar energy' in India.

Ans. The features of solar energy in India are:

- (i) Renewable energy source
- (ii) Reduces electricity bills
- (iii) Low maintenance costs
- (iv) Technology development

Q 18. Mention any four characteristics of non-conventional sources of energy in India.

Ans. The main features of non-conventional sources of energy in India are:

- (i) They are inexhaustible.
- (ii) They do not cause pollution.
- (iii) They are cheap to be maintained, stored and transmitted.
- (iv) They include wind, tidal, solar geothermal and bioenergy.

Q 19. Mention any four features of 'Tidal and Wave energy' in India.

Ans. The features of 'Tidal and Wave energy' in India are:

- (i) It is reliable and renewable source of energy.

(ii) It does not pollute the atmosphere.

(iii) It produces no green grass and no other waste.

(iv) It is energy efficient.

Q 20. Mention any four features of wind energy in India.

Ans. The features of wind energy in India are:

(i) It is a clean fuel source.

(ii) It is sustainable.

(iii) It is a domestic source of energy.

(iv) It can be built on existing farms.



Short Answer Type Questions ↘

Q 1. Write a detailed note on the petroleum resources of India.

Ans. Crude petroleum consists of hydrocarbons in liquid and gaseous states and varying in chemical composition, colour and specific gravity. It occurs in sedimentary rocks of tertiary period. Till 1956, Digboi in Assam was the only oil producing region. But in recent years, new oil deposits have been found at the extreme western and eastern parts of the country. The areas where petroleum resources are located are:

Assam

- Digboi, Naharkatya and Moran are major oil producing areas.

Gujarat

- Ankleshwar, KaloL, Mehsana, Nawagam, Kosamba and Lunel are the major oil fields.

Mumbai High

- It lies 160 km off Mumbai, was discovered in 1973 and commenced production in 1976.

Exploratory Wells

- Exploratory wells in Krishna-Godavari and Kaveri basin on the East coast.

Q 2. Explain any three main characteristics of mineral resources.

Ans. Three main characteristics of mineral resources are as follows:

(i) Uneven Distribution Over Earth's Surface:

The distribution of mineral over the earth's surface is uneven. Some regions are rich in minerals whereas others are deficient in minerals.

(ii) Inverse Relationship between Quality and Quantity:

The quality and quantity of minerals have an inverse relationship. Minerals of good quality are less in amount whereas minerals of low quality are more in amount on earth.

(iii) Exhaustible in Nature:

Minerals are exhaustible in nature i.e., once used, they can't be used again. Minerals take long time to develop geologically and once they get exhausted, they cannot be replenished immediately at the time of need.

Q 3. Give two advantage of manganese. Mention four manganese producing states of India.

Ans. Two advantages of manganese are:

- (i) It is used as a raw material in iron and steel industry for smelting of iron-ore.
- (ii) It is also used in the manufacturing of ferroalloys. The manganese producing states of India are:

Odisha

Leading producer of manganese. Important mines are located in districts of:

- Bonai
- Kendujhar
- Sundergarh
- Gangpur
- Koraput
- Kalahandi
- Bolangir

Karnataka

Important mines are located in districts of:

- Dharwad
- Ballari
- Belgaum
- North Canara
- Chikmagalur
- Shivamogga
- Chitradurga
- Tumakur

Maharashtra

Important mines are found in districts of:

- Bhandara
- Nagpur
- Ratnagiri

Madhya Pradesh

Mines are located in a belt that extends through the following districts:

- Balaghat
- Chhindwara
- Nirmal Mandla
- Jabua

Q 4. Give two advantages of 'Copper'. Mention four copper mining areas of India.

Ans. Two advantages of copper are:

- (i) As it is alloyable, malleable and ductile, it is mostly used in electrical industry for making wires, electric motors, generators etc.
- (ii) It is mixed with gold by jewellers to provide strength to jewellery.

Four copper mining areas of India are:

Jharkhand

- Singhbhum district

Madhya Pradesh

- Balaghat district

Rajasthan

- Jhunjhunu and Alwar districts

Andhra Pradesh

- Agnigundala in Guntru district

Karnataka

- Chitradurga and Hassan districts

Tamil Nadu

- South Arcot district

Q 5. Give an account of production and use of coal in India.

Ans. About 80% of coal found in India is bituminous coal

of non-cooking grade. In India, coal is found in two rock sequences:

(i) Gondwana Coalfields

(a) They are located in the valleys of:

- Damodar
- Godavari
- Mahanadi
- Son

(b) They lie in Jharkhand-Bengal coal belt.

Important coal fields in this region are:

- Raniganj (2nd largest coal field)
- Jharia (Largest coal field)
- Bokaro
- Giridih
- Karanpura

(c) Most important coal mining centres are:

- Madhya Pradesh → Singrauli
- Chhattisgarh → Korba
- Odisha → Talcher and Rampur
- Maharashtra → Chanda Wardha
- Kamptee and Bander
- Telangana → Singareni
- Andhra Pradesh → Pandur

(ii) Tertiary Coal Fields

They occur in:

(a) **Assam:** Extracted from Makum, Jalpur and Nalza in upper Assam.

(b) **Meghalaya:** Extracted from Darangiri, Cherrapunji, Mewlong and Langrin.

(c) **Arunachal Pradesh:** Extracted from Namchik-Namphuk.

(d) **Jammu & Kashmir:** Extracted from Kalakot.

(e) **Nagaland:** The uses of coal are:

- It is used in the generation of thermal power.
- It is used in the smelting of iron-ore.

Q 6. Why is it necessary to develop bio-energy in India? OR

Explain the significance of bio-energy to human kind in India. (CBSE 2016)

Ans. Bio-Energy: It refers to energy derived from biological products which includes agricultural residues, municipal, industrial and other wastes.

Significance of bio-energy to humankind in India can be understood from the following points:

(i) Potential Source of Energy Conversion:

Bio-energy can be converted into:

- electrical energy
- heat energy
- gas for cooking

Benefit: This converted energy form can be used for a variety of purposes.

(ii) Helps in Processing of Waste and Energy

Production:

It will process the waste and garbage and produce energy.

Benefit: This will improve economic life of rural areas, reduce environmental pollution, enhance self-reliance, reduce pressure on fuel wood.

Example of a project converting waste into energy is 'Okhla' in Delhi.

Q 7. Describe the uneven distribution of mineral and energy resources in India by giving suitable examples.

Ans. India is a rich country in terms of minerals. However, there is uneven distribution of mineral and energy resources in country. It is explained through following examples:

- (i) Most of the metallic minerals occurs in the peninsular plateau region in the old crystalline rocks.
- (ii) River valleys of Damodar, Son, Mahanadi and Godavari have over 97% of coal reserves in India.
- (iii) Sedimentary basins of Assam and off-shore region in the Arabian Sea (Gujarat and Mumbai High) are famous for their crude petroleum reserves.
- (iv) The area to the east of a line joining Mangaluru and Kanpur has most of the major mineral resources of India.
- (v) Mineral are mainly concentrated in three broad belts, namely:
 - (a) The North-Eastern Plateau region.
 - (b) The South-Western Plateau region.
 - (c) The North-Western Plateau region.

Q 8. "The promotion of the use of non-conventional sources of energy in India is the need of the hour." Support the statement. (NCERT 2016)

Ans. The promotion of the use of non-conventional sources of energy in India is the need of the hour due to the following reasons:

- (i) **They are Cheaper and Renewable:** Unlike conventional sources of energy, most of the non-conventional energy sources are cheaper and renewable. The limitation and scarcity of fossil fuels have given rise to the urgent need for using the alternative energy sources such as renewable non-conventional energy resources.
- (ii) **They are Environmental Friendly:** Power from non-conventional and renewable sources is must in order to reduce carbon dioxide (CO₂) emissions from the coal-based power plants. Non-conventional resources are environment friendly.
- (iii) **They Meet Rural Energy Needs Efficiently:** Locally available non-conventional and renewable power resources like wind and sun can meet local rural energy needs with minimum costs. Thus, non-conventional energy resources will ensure sustainable development by meeting the needs of the present generation without harming the need of future generation.

Q 9. "Conservation of minerals is more important than other resources." Explain by giving three arguments.

Ans. Conservation of minerals is more important than other resources due to the following reasons:

- (i) Minerals are important as large number of industries are dependent on them as raw materials.
- (ii) We are rapidly consuming mineral resources which took millions of years to form.
- (iii) Minerals are in insufficient quantities and exhaustible.
- (iv) Mineral conservation is necessary because once they get exhausted, it will be difficult to find other alternatives to take their place.
- (v) Economic and Industrial development of a country depends on minerals.

Q 10. Explain any three methods of conservation of mineral resources in India.

Ans. Three methods of conservation of mineral resources in India are:

- (i) **Adoption of Renewable Resource:** To conserve our mineral resources, we must adopt renewable resources in place of exhaustible resources like solar power, wind, wave, geothermal energy, etc.
- (ii) **Use of Recycled Scrap Metals**
To prevent the mining of newer metals, recycled scrap metals must be used. Scope of recycling scarce metallic minerals like zinc, copper, lead etc., is more in India because our country is deficient in such minerals.
- (iii) **Encouragement of Use of Substitutes**
Substitutes for some precious and scarce metals should be encouraged. This will help to reduce their consumption.

Q 11. Name the three agencies that are involved in the exploration of minerals in India. (CBSE 2016)

Ans. In India, systematic surveying, prospecting and exploration for minerals is undertaken by the Geological Survey of India (GSI), Oil and Natural Gas Corporation (ONGC) and Mineral Exploration Corporation LTD (MECL).

Q 12. Explain three reasons for import of petroleum and its products in large quantities in India. (CBSE 2016)

Ans. Reasons for the import of petroleum and its products in large quantities in India are as follows:

- (i) Production of petroleum and its products is less than required in India.
- (ii) It is used as a fuel.
- (iii) Demand increased due to rise in population and number of vehicles on the roads.



Long Answer Type Questions

Q 1. Which are the two main ferrous minerals found in India? Describe four characteristics of each.

Ans. The two main ferrous minerals found in India are **Iron ore** and **manganese**.

Characteristics of Iron ore in India are:

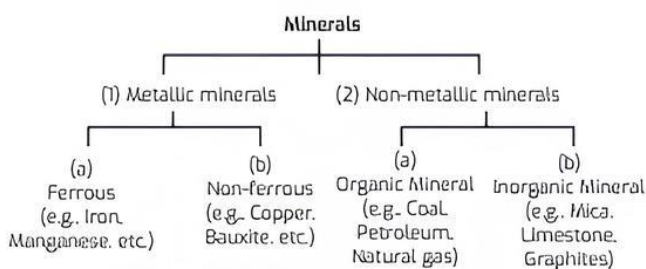
- (i) India has largest Iron ore reserves in Asia.
- (ii) India produces superior quality of haematite and magnetite Iron ore which have a great demand in international market.
- (iii) Iron ore mines in India are found near coalfields which is an advantage to Iron ore industries of India.
- (iv) Indian states like Odisha, Jharkhand, Karnataka and Maharashtra have about 95% of total Iron ore reserves in India.

Characteristics of manganese in India are:

- (i) It is an important raw material which is used in iron and steel industries for smelting of iron ore.
- (ii) Manganese in India is mainly associated with Dharwar rock system.
- (iii) Odisha is the leading manganese producer of India.
- (iv) Karnataka, Maharashtra and Madhya Pradesh are other important producer states of manganese.

Q 2. Classify minerals into two groups on the basis of chemical and physical properties and give one example of minerals of each group. Mention any two features of the three mineral belts of India.

Ans. On the basis of chemical and physical properties, minerals may be grouped under two main categories of metallic and non-metallic minerals which may be further classified as follow:



Features of the three mineral belts are:

(i) North-Eastern Plateau Region

- (a) It covers Chota Nagpur in Jharkhand, Odisha Plateau, West Bengal and parts of Chhattisgarh.
- (b) It contains minerals such as Iron ore, coal, manganese, bauxite and mica.

(ii) South-Western Plateau Region

- (a) It extends over Karnataka, Goa, Tamil Nadu uplands and Kerala.

- (b) It is rich in ferrous minerals and iron ore, manganese and limestone. It also contains Neyveli lignite coal.

(iii) North-Western Region

- (a) It extends along Aravalli in Rajasthan and parts of Gujarat.
- (b) Minerals are associated with Dharwar system of rocks. Minerals found here are copper, zinc, sandstone, granite and marble.

Q 3. "Conservation of mineral resources is essential for the development of India." Examine the statement.

Ans. Conservation of mineral resources is essential for development of India because of multiple reasons. In the last few decades, mismanagement and overexploitation of resources has put India's development at risk. Their conservation is essential because of following reasons:

(i) Uneven Distribution of Mineral Resources Across the Country: In India, mineral resources are unevenly distributed throughout the country. If these resources become extinct, then it will be a huge challenge to fulfil domestic requirement.

(ii) Dependence of Large Number of Industries: Its conservation is important as large number of industries are completely dependent on mineral resources.

(iii) Economic Pressure Due to Imports: If mineral resources are not conserved, then we have to import them from other countries which will put a huge economical burden on the country.

(iv) Long Process of Formation: The formation of minerals takes a number of years. Moreover, they are finite and non-renewable. Once finished, they take millions of years for their replenishment.

(v) Moral Responsibility: Every country has a moral responsibility to conserve resources for the future generation, so that, they can also use them for their development. Hence, efficient and judicious use of minerals is the demand of time, if we want to ensure development of India.

Q 4. "The non-conventional sources of energy will provide more sustained, eco-friendly and cheaper energy if the initial cost is taken care of." Examine the statement. (CBSE 2019)

OR

"The non-conventional sources of energy in India will provide more sustained and environment friendly energy". Examine the statement.

(CBSE 2019)

OR

"The promotion of use of non-conventional sources of energy in India is the need of the hour." Support the statement. (CBSE 2016)

Ans. Non-conventional energy resources involve higher costs in setting up of large plants and equipment such as large wind mills, solar panels, nuclear plants, generators and storage equipments. If this cost is taken care of by providing subsidies, discounts and monetary support, the non-conventional energy resources will provide more sustained and environment friendly energy. It is because of following reasons:

(i) **They are Cheaper and Renewable:** Unlike conventional sources of energy, most of the non-conventional energy sources are cheaper and renewable. The overall limitation and scarcity of fossil fuels has given rise to the urgent need for exploiting alternative energy sources.

(ii) **They are Environment Friendly in Nature:** Power from non-conventional and renewable sources is a must in order to reduce carbon dioxide (CO₂) emissions of the coal-based power plants. Non-conventional sources are inexhaustible in nature and environment friendly.

(iii) **They Meet Rural Energy Needs Efficiently:** Locally available non-conventional and renewable power resources can meet localised rural energy needs with minimum transportational cost.

(iv) **They are Easy Available:** The non-conventional energy sources are solar energy, wind energy, geothermal energy, biomass energy, etc. These are easily available in the country and can be harnessed with the help of modern technology.

(v) **They are Capable of Regeneration:** These sources are capable of regeneration. These can be renewed along with exploitation and hence, always available for us.

Q 5. Electricity is one of the greatest inventions of all times. It is mostly generated by using coal, natural gas and petroleum, which are exhaustible resources. Can you imagine the human society without electricity? This may happen in future, when all energy resources will be exhausted. Explain the values that can change this possible darkness scenario. (CBSE 2015)

Ans. Energy resources are very important as well as scarce for human kind as most of the work is done with the help of these resources, e.g., coal, natural gas, petroleum and nuclear energy. One cannot imagine a human society without these. But at the rate at which these are being consumed, it is possible that these will get exhausted soon. So, we have to take great care of these resources by taking the following steps:

- (i) Maximum utilisation of renewable energy resources i.e., solar energy, wind energy, tidal energy, etc.
- (ii) Creating awareness among the masses about the judicious use of these resources.
- (iii) Optimum use of energy resources and minimum wastage.
- (iv) Development of alternative sources of energy.
- (v) Promotion of the concept of sustainable development.



Map Based Questions

Q 1. Mark the following mines on the political map of India.

(i) **Iron-ore mines:** Mayurbhanj, Balladila, Ratnagiri, Ballari. (CBSE SQP 2023-24)

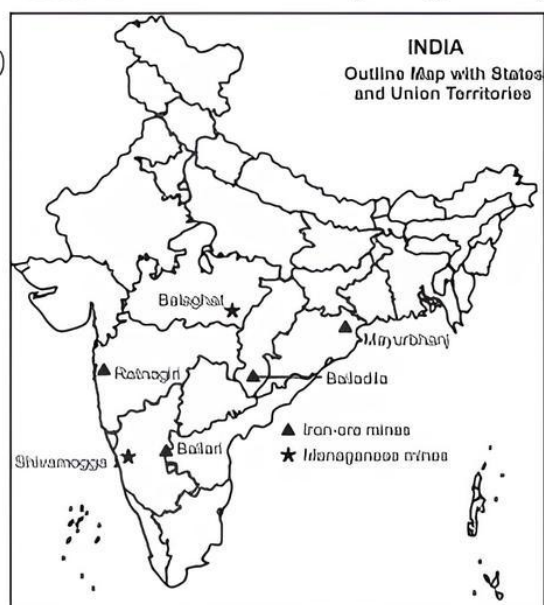
Manganese mines: Balaghat, Shivamogga.

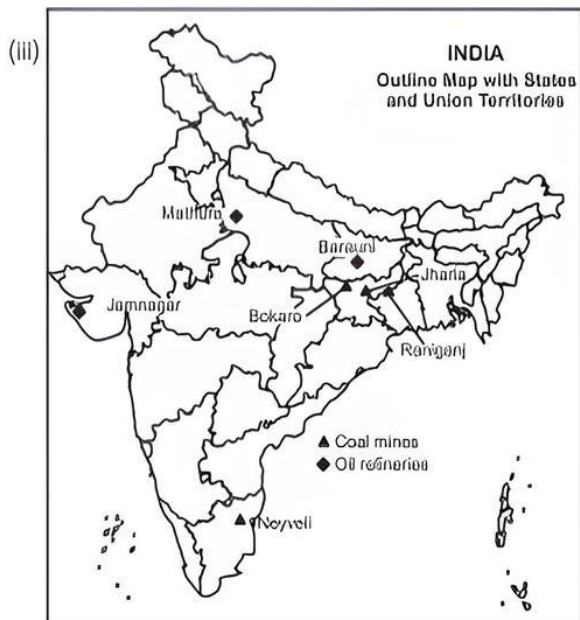
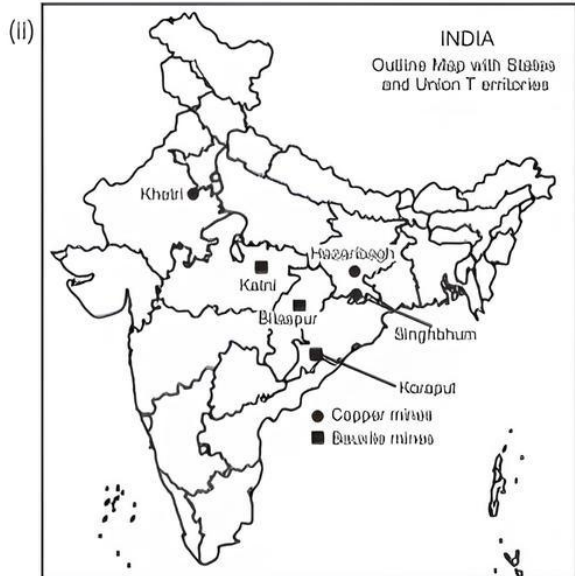
(ii) **Copper mines:** Hazaribagh, Singhbhum, Khetri.
Bauxite mines: Katni, Bilaspur and Koraput.

(iii) **Coal mines:** Jharia, Bokaro, Raniganj, Neyveli (Tamil Nadu). (CBSE SQP 2023-24)

Oil refineries: Mathura, Jamnagar, (Gujarat) Barauni. (CBSE SQP 2023-24)

Ans. (i)

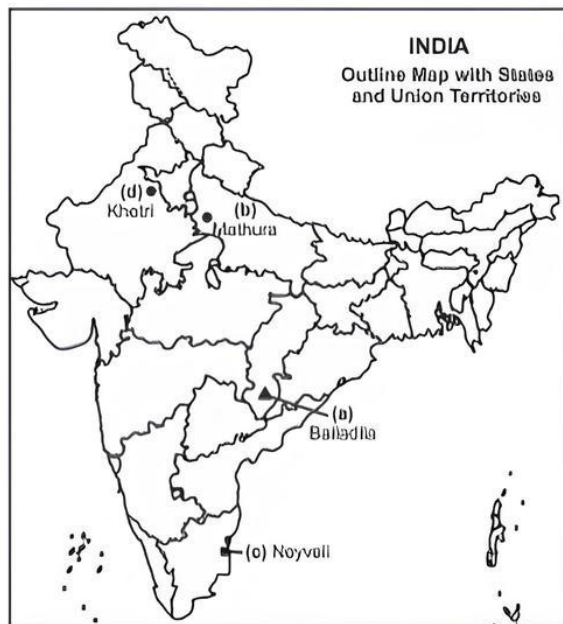




Q 2. On the outline map of India, indicate and mark the following features. (CBSE SQP 2022 Term-2)

- Iron ore mines located in Southernmost part of Chhattisgarh (Bailadila).
- Oil refinery located in Uttar Pradesh (Mathura).
- The largest lignite coal mines (Neyveli).
- Oldest Copper mines of Rajasthan (Khetri).

Ans.

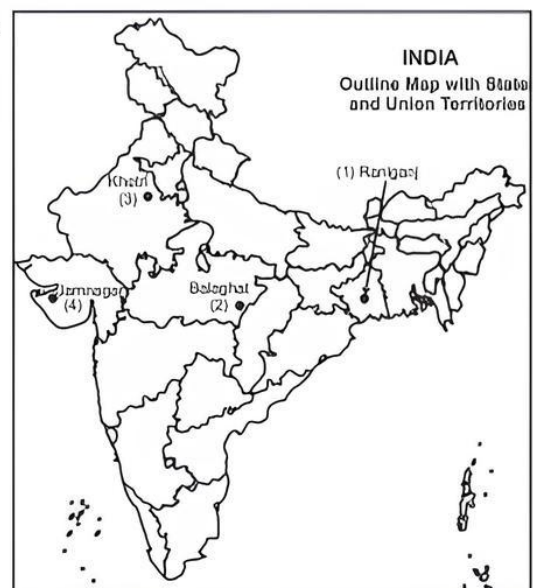


Q 3. On the given political outline map of India, locate and label any five from the following Geographical features with appropriate symbols:

(CBSE 2022 Term-2)

- Raniganj – Coal mines
- Balaghat – Manganese mines
- Khetri – Copper mines
- Jamnagar – Oil refineries

Ans.



Chapter Test

Multiple Choice Questions

Q 1. The kinetic energy of wind, through turbines, is converted into:

- bio-energy
- electrical energy
- geothermal energy
- nuclear energy

Q 2. Most of the metallic minerals in India occur in the:

- Peninsular plateau region
- Northern plains
- Himalayan range
- North-East region

Assertion and Reason Type Questions

Q 3. In the question given below, there are two statements marked as Assertion (A) and Reason (R). Read the statements and choose the correct option:

Assertion (A): Ferrous minerals are rich in iron content.

Reason (R): Distribution of minerals is ubiquitous (even) in nature.

- Both (A) and (R) are true and (R) is the correct explanation of (A).
- Both (A) and (R) are true, but (R) is not the correct explanation of (A).
- (A) is true, but (R) is false.
- (A) is false, but (R) is true.

Passage Based Question

Q 4. Read the passage given below and answer the questions that follow:

India is endowed with fairly abundant resource of iron ore. It has the largest reserve of iron ore in Asia. The two main types of ore found in the country are haematite and magnetite. It has great demand in international market due to its superior quality. The iron ore mines occur in close proximity to the coal fields in the North-Eastern plateau region of the country which adds to their advantage. About 95 percent of total reserves of iron ore is located in the states of Odisha, Jharkhand, Chhattisgarh, Karnataka, Goa, Telangana, Andhra Pradesh and Tamil Nadu. In Odisha, iron ore occurs in a series of hill ranges in Sundergarh, Mayurbhanj and Keonjhar. The important mines are Gorumahisani, Sulaipet, Badampahar (Mayurbhanj), Kiriburu (Kendujhar) and Bonai (Sundergarh). Jharkhand has some of the oldest iron ore mines and most of the iron and steel plants are located around them. Most of the important mines such as Noamundi and Gua are located in Poorvi and Pashchimi Singhbhum districts. This belt further extends to Durg, Dantewada and Bailadila. Dalli, and Rajhara in Durg are the important mines of

iron-ore in the country. In Karnataka, iron ore deposits occur in Sandur-Hospet area of Ballari district, Baba Budan hills and Kudremukh in Chikkamagaluru district and parts of Shivamogga, Chitradurga and Tumakur districts. The districts of Chandrapur, Bhandara and Ratnagiri in Maharashtra, Karimnagar and Warangal district of Telangana, Kurnool, Cuddapah and Anantapur districts of Andhra Pradesh, Salem and Nilgiri districts of Tamil Nadu are other iron mining regions. Goa has also emerged as an important producer of iron ore. Manganese is an important raw material for smelting of iron ore and also used for manufacturing ferro alloys. Manganese deposits are found in almost all geological formations. However, it is mainly associated with Dharwar system. Odisha is the leading producer of manganese. Major mines in Odisha are located in the central part of the iron ore belt of India, particularly in Bonai, Kendujhar, Sundergarh, Gangpur, Koraput, Kalahandi and Bolangir.

- Which mineral are is found in Mayurbhanj Hills?
- In which rocks are manganese mineral is found?
- Where are Baba Budan hills located in? Explain the different ores of iron.

Very Short Answer Type Questions

- Name two conventional sources of energy.
- Define metallic minerals.
- Which is the largest oil refinery in India?

Short Answer Type Questions

- Give an account of the distribution of mica in India.
- Write a detailed note on the petroleum resources of India.

Long Answer Type Questions

- Explain the importance of non-conventional sources of energy such as solar, wind and biogas.
- "Conservation of mineral resources is essential for the development of India." Examine the statement.