CHAPTER: 5

Minerals and Energy Resources

- Facts at Your Fingertips
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Facts at Your Fingertips

➡ **Mineral:** Geologists define mineral as a "homogeneous, naturally occurring substance with a definable internal structure." Minerals have physical and chemical properties by which they can be identified.

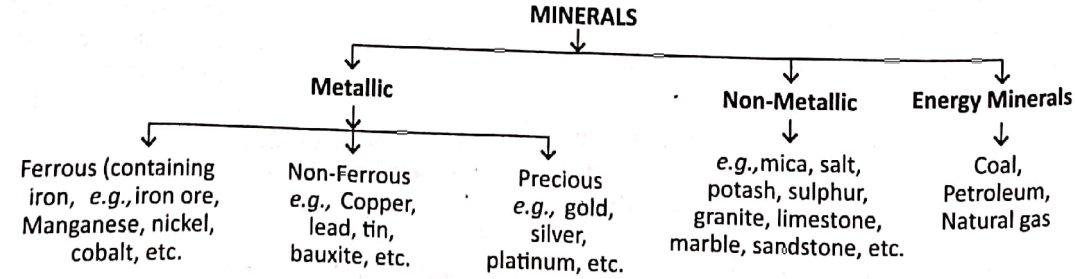
➡ **Rocks** are combinations or aggregates of minerals in varying proportions. Some rocks consist of a single mineral, *e.g.,* limestone while most rocks consist of several minerals.

➡ The term **'ore'** is used to describe an accumulation of any mineral mixed with other elements.

➡ ***Minerals generally occur in the following forms:***

1. **Veins and lodes.** In igneous and metamorphic rocks minerals may occur in the cracks, faults or joints by getting solidified in them. The smaller occurrences are called **veins** and the larger **lodes**, *e.g.,* metallic minerals like tin, copper, zinc and lead, etc. are found in lodes and veins.
2. In sedimentary rocks minerals occur in **beds or layers.** They are formed as a result of deposition, accumulation and concentration in horizontal strata. Some sedimentary minerals are formed as a result of **evaporation,** especially in arid regions, *e.g.,* gypsum, potash and salt.
3. Another mode of formation involves decomposition of surface rocks and the removal of soluble contents, leaving a **residual** mass of weathered material containing ores. Bauxite is formed this way.
4. **Placer deposits.** Certain minerals occur as alluvial deposits in sands of valley floors and the base of hills, *e.g.,* gold, silver, tin and platinum. These are called placer deposits and contain minerals which are not corroded by water.
5. **Ocean waters** contain vast quantities of minerals, *e.g.,* common salt, magnesium and bromide are largely derived from the ocean waters. The ocean beds are rich in manganese nodules.

➡ **Classification of Minerals:**



➡ **Four types of iron ores are:** Magnetite, Hematite, Siderite and Limonite.

Two best ores are:

1. **Magnetite:** It is the finest iron ore available with upto 70% iron content. It has excellent magnetic qualities and is especially valuable in the electrical industry.
2. **Hematite:** It is the most important industrial iron ore in terms of quantity used. It has 50-60% iron content.

Four major iron ore belts:

1. **Odisha-Jharkhand Belt:** Badampahar Mines—High grade hematite ore is found here.
2. **Durg-Bastar-Chandrapur Belt:** Bailadila Mines—Super high grade hematite ore deposits are found in Bailadila range. Iron ore from these mines is exported to Japan and South Korea.
3. **Ballari-Chitradurga-Chikkamagaluru-Tumakuru Belt in Karnataka:** Kudremukh Mines—A 100 per cent export unit. The ore is transported as slurry to a port near Mangalore.
4. **Maharashtra-Goa Belt:** Ratnagiri district of Maharashtra—Ores are not of very high quality. Iron ore is exported through Marmagao port.

➡ **Aluminium** is obtained from **bauxite** ore. It is an important metal because it has the strength of metals such as iron, and is extremely light at the same time; it has good conductivity; and it has great malleability.

➡ **Bauxite** deposits are formed by the decomposition of a wide variety of rocks rich in aluminium silicates. Leading State of bauxite production is Odisha, producing 45% of the total bauxite of India. The most important bauxite deposits are found in Panchpatmali in Koraput district.
Other States are: Gujarat (17%), Jharkhand (14%) and Maharashtra (11%).

➡ **Mica** is made up of a series of plates or leaves. It splits easily into such thin sheets that a thousand put together are only a few centimetres thick. Mica is indispensable for electric and electronic industry because it has—(*i*) excellent di-electric strength; (*ii*) Low power loss factor; (*iii*) Insulating properties; and (*iv*) Resistance to high voltage. Mica deposits are found in the northern edge of Chhota Nagpur Plateau. **Jharkhand** is the leading producer. The important mica producing belt here is Koderma-Gaya-Hazaribagh.

➡ ***Dangers involved in mining are:*** 1. The risk of collapsing mine roofs; 2. Inundation, *i.e.*, flooding in mines; 3. Fires in coal-mines is a constant threat to the miners; and 4. Poisonous gases, dust and noxious fumes inhaled by miners make them vulnerable to pulmonary diseases.

Adverse effects of mining on the environment: 1. The water sources in the region get contaminated; 2. Dumping of the slurry and waste leads to degradation of land and soil; and 3. It also leads to an increase in stream and river pollution.

➡ ***Conservation of minerals is necessary because:***

1. The formation of minerals takes a long geological period of millions of years.
2. They are finite in nature, non-renewable and exhaustible.
3. The rate of replenishment of minerals is infinitely small in comparison to rate of consumption.
4. They have to be preserved for our future generations.

➡ ***Methods of mineral conservation:***

1. We should use minerals in a planned and sustainable manner.
2. Improved technologies need to be evolved to allow use of low grade ores at low cost.
3. Recycling of metals, using scrap metals and other substitutes. Wastages in mining, processing and distribution should be minimised.
4. Controlled export of minerals.

➡ Energy resources can be classified as conventional and non-conventional sources.
Conventional sources include coal, petroleum, natural gas and electricity (both hydel and thermal). All these sources have been in use for quite some time.
Non-conventional sources of energy are relatively new sources as their large scale generation has started recently. These include solar, wind, tidal, geothermal, biogas and atomic energy.

➡ ***Coal as an important source of energy:***

1. It provides a substantial part of the nation's energy needs as it is abundantly available.
2. It is used for power generation, to supply energy for industrial and domestic needs.
3. India is highly dependent on coal for meeting its commercial needs. Its share in total is 67%.
4. It can easily be converted into other forms of energy—electricity, gas, oil, etc.

Coal as an industrial raw material:

1. It is an indispensable raw material for iron and steel industry.
2. It provides raw material for chemical industries and synthetic textile industries.
3. Many coal-based products are processed in industries, *e.g.*, coal tar, graphite, soft coke, etc.
4. Power generation industry is mainly based on this fossil fuel.

Four types of coal and their characteristics:

(*a*) **Anthracite:** It is the highest quality hard coal. It contains more than 80% carbon content. It gives less smoke.

(*b*) **Bituminous:** It is the most popular coal in

commercial use and has 60-80% carbon content. Metallurgical coal is high grade bituminous coal and is of special value for smelting iron in blast furnaces.

(*c*) **Lignite:** It is a low grade brown coal. It is soft with high moisture content. The main lignite reserve is Neyveli in Tamil Nadu.

(*d*) **Peat:** It has a low carbon and high moisture content. It has low heating capacity and gives lot of smoke on burning.

Occurrence of coal:

1. **Gondwana Coal Belt:** A little over 200 million years in age. Mainly metallurgical coal is found in—(*a*) Damodar Valley Belt (West Bengal, Jharkhand) which contains important coal mines of Jharia, Raniganj and Bokaro; (*b*) The Godavari Valley Belt; (*c*) The Mahanadi Valley Belt; and (*d*) Wardha Valley Belt.
2. **Tertiary coal** deposits are only about 55 million years old, *i.e.,* they are comparatively younger.

They occur in North-Eastern States, namely: Assam, Meghalaya, Arunachal Pradesh and Nagaland.

➡ **Petroleum:** It is the second most important energy source of India after coal. It can be easily transported by pipelines and does not leave any residue. It provides fuel for heat and light. It provides lubricants for machinery. It provides raw material for a number of manufacturing industries. It is an important fuel used in transportation sector. Petroleum refineries act as a 'nodal industry' for synthetic textiles, fertilizers and many chemical industries.

Occurrence and formation of petroleum: Most of the petroleum occurrences in India are associated with anticlines and fault traps in the rock formations of the tertiary age. In regions of folding anticlines it occurs where oil is trapped in the crest of the up fold. The oil bearing layer is porous limestone or sandstone through which oil may flow. Petroleum is also found in fault traps between porous and non-porous rocks.

Distribution of petroleum:

- **Mumbai High** is an offshore oilfield and is the richest oilfield of India. Its share is about 63% of India's petroleum production;
- **Gujarat** produces 18% petroleum of India. Ankaleshwar is the most important field; and
- **Assam** is the oldest oil producing State of India. Its contribution in the total production is 16%.

Important oilfields are: Digboi, Naharkatiya and Moran-Hugrijan.

➡ **Non-Conventional Sources of Energy**

Nuclear Energy: Nuclear energy is obtained by altering the structure of atom. When the structure of an atom is altered, too much energy is released in the form of heat. This heat is utilised to generate electric power. Uranium and Thorium are used for generating atomic power. These minerals are available in Jharkhand and Aravalli ranges of Rajasthan.

Solar Energy: Photovoltaic technology is used to convert solar energy into electricity. The largest solar plant of India is located at Madhapur near Bhuj. Solar energy holds great promises for the future. It can help in minimizing the dependence on firewood and animal dung cakes in rural areas. This will also help in conservation of fossil fuels.

Wind Power: The wind farm cluster in Tamil Nadu (from Nagarcoil to Madurai) is the largest cluster in India. Andhra Pradesh, Karnataka, Gujarat, Kerala, Maharashtra and Lakshadweep are also important centres of wind power production. India is now a "Wind Super Power" in the world.

Biogas: Biogas can be produced from shrubs, farm waste and animal and human waste. It is more efficient than kerosene, dung cake and charcoal. Biogas plants can be set up at municipal, cooperative and individual levels. The gobar gas plants provide energy and also manure.

Tidal Energy: Dams are built across inlets. The water flows into the inlet during high tide & gets trapped when the gate is closed. Once the tide recedes, the floodgates are opened so that water can flow back to the sea. The flow of water is used to run the turbines to generate electricity. A 900 MW tidal energy power plant is set up by the National Hydropower Corporation in the Gulf of Kuchchh.

Geo-Thermal Energy: We know that the inside of the earth is very hot. At some places, this heat is released on the surface through fissures. Groundwater in such areas becomes hot and rises up in the form of steam. This steam is used to drive turbines. Two geo-thermal energy projects—the Parvati valley near Manikarn in Himachal Pradesh and the Puga valley in Ladakh.

➡ **Importance of energy:** Energy is required for all activities. It is needed to cook, to provide light and heat, to propel vehicles and to drive machinery in industries. It is the basic requirement for economic development. Every sector of national economy needs greater inputs of energy. Energy demands, in the form of electricity, are growing because of increasing use of electrical gadgets and appliances.

Ways to conserve energy:

(*i*) Using more of public transport system instead of individual vehicles.

(*ii*) Switching off electrical devices when not in use and use of power saving devices.

(*iii*) Using non-conventional sources of energy such as solar energy, wind energy, etc.

(*iv*) Getting the power equipment regularly checked to detect damages and leakages.

NCERT Exercise

1. Multiple choice questions:

(*i*) Which one of the following minerals is formed by decomposition of rocks, leaving a residual mass of weathered material?

(*a*) Coal (*b*) Bauxite (*c*) Gold (*d*) Zinc

(*ii*) Koderma, in Jharkhand, is the leading producer of which one of the following minerals?

(*a*) Bauxite (*b*) Mica (*c*) Iron ore (*d*) Copper

(*iii*) Minerals are deposited and accumulated in the stratas of which of the following rocks?

(*a*) Sedimentary rocks (*b*) Igneous rocks (*c*) Metamorphic rocks (*d*) None of the above

(*iv*) Which one of the following minerals is contained in the Monazite sand?

(*a*) Oil (*b*) Uranium (*c*) Thorium (*d*) Coal

Ans. (*i*) (*b*) (*ii*) (*b*) (*iii*) (*a*) (*iv*) (*c*)

2. Answer the following questions in about *30 words*.

(*i*) Distinguish between the following in not more than *30 words*.

(*a*) ferrous and non-ferrous minerals

(*b*) conventional and non-conventional sources of energy

(*ii*) What is a mineral?

(*iii*) How are minerals formed in igneous and metamorphic rocks?

(*iv*) Why do we need to conserve mineral resources?

Ans. (*i*) (*a*) **Difference between ferrous and non-ferrous minerals:**

Ferrous minerals	*Non-ferrous minerals*
(*a*) Ferrous minerals have iron content.	(*a*) Non-ferrous minerals do not have iron content.
(*b*) These minerals have little resistance to corrosion.	(*b*) They have more resistance to corrosion.
(*c*) Iron ore and manganese are the examples of ferrous minerals.	(*b*) Copper, lead, zinc, gold and bauxite are the examples of non-ferrous minerals.

(*b*)

Conventional Sources	Non-conventional Sources
1. They have been in use since ages.	1. The technology for their large-scale development is relatively new.
2. Except hydel power they are exhaustible or non-renewable, *e.g.*, coal, petroleum and natural gas.	2. They are inexhaustible sources of energy, *e.g.*, solar, wind and tidal energy.
3. These non-renewable resources create pollution.	3. They are pollution-free, therefore are Eco-friendly.
4. Except water, all other sources of energy are available in limited quantities.	4. They are freely and abundantly available in nature.
5. It is costly.	5. It is a relatively cheaper source.
6. Because of their limited availability and exhaustible nature, we cannot depend on them for a long time.	6. Because of their abundant availability, they are dependable sources. Therefore, they are called our future energy resources.

(*ii*) Geologists define **mineral** as a "homogeneous, naturally occurring substance with a definable internal structure." They have physical and chemical properties by which they can be identified.

(*iii*) In igneous and metamorphic rocks minerals may occur in the cracks, crevices, faults or joints. The smaller occurrences are called veins and the larger are called lodes. In most cases, they are formed when minerals in liquid/molten and gaseous forms are forced upward through cavities towards the earth's surface. They

cool and solidify as they rise. Major metallic minerals like tin, copper, zinc and lead etc. are obtained from veins and lodes.

(iv) ***Conservation of minerals is necessary because of the following reasons:***

- The formation of minerals takes a long geological period of millions of years.
- They are finite, *i.e.,* limited in nature.
- Many of them are non-renewable and exhaustible.
- The rate of replenishment of minerals is infinitely small in comparison to rate of consumption.
- They have to be preserved for our future generations because they are very important for industrial development of the nation.

3. Answer the following questions in about *120 words*.

(i) Describe the distribution of coal in India.

(ii) Why do you think that solar energy has a bright future in India?

Ans. (i) Coal is an important fossil fuel of India as it is generously available and is used for meeting a major share of our country's energy demands. It is for this reason that India is excessively dependent on coal to fulfill its commercial energy demand. Coal is found in India in two geological rock series which are Gondwana and Tertiary. Coal in the Gondwana rock series is about 200 million years old, while the tertiary deposits are approximately 55 million years old. The major ores of Gondwana coal are found in the Damodar valley (West Bengal, Jharkhand). Jharia, Raniganj and Bokaro are important coalfields for Gondwana coal. The Godavari, Mahanadi, Sone and Wardha valleys also contain coal deposits of the Gondwana rock series. Tertiary coal deposits occur mainly in the north-eastern states of Meghalaya, Assam, Arunachal Pradesh and Nagaland.

(ii) ***Solar energy has a bright future in India because:***

- India is a tropical country and gets abundant sunshine.
- It has enormous possibilities of tapping solar energy.
- It is an inexhaustible source of energy which is freely available in nature.
- It is a cheaper source of energy and is fast becoming popular in rural and remote areas.
- Photovaltic technology is available which converts sunlight directly into electricity.
- Because of its abundant and free availability in all parts of India in addition to its Eco-friendly nature, solar energy is called the energy of future.

SUBJECTIVE TOPIC-1
What is a Mineral?

Short Answer Type Questions (SA-I) (Easy) (1 Mark)

1. Define the term 'mineral'.

Ans. Geologists define mineral as a "homogeneous, naturally occurring substance with a definable internal structure". Minerals have physical and chemical properties by which they can be identified.

2. Define the term 'rock'.

Ans. **Rocks** are combinations or aggregates of minerals in varying proportions. Some rocks consist of a single mineral, *for example*, limestone while most rocks consist of several minerals.

Related Concept

Rock Cycle: A rock can begin as one type and can change many times. In fact, rocks are always changing. However, the changes happen so slowly that they are difficult to see. We know that heat and pressure can change rocks, which then break down by weathering and move by erosion. It can take thousands of years for rocks to weather and erode. This process of change is called the rock cycle.

Short Answer Type Questions (SA-II) (Average) (2-3 Marks)

3. Why are there a wide range of colours, hardness, crystal forms, lustre and density found in minerals? (2016 *Delhi*)

Ans. A mineral that will be formed from a certain combination of elements depends upon the physical and chemical conditions under which the mineral forms. It is because of these physical and chemical conditions that minerals possess a wide range of colours, crystal forms, lustre and density.

4. "Minerals are an indispensable part of our lives." Comment. (2011 *Outside Delhi*)

Ans. Almost everything we use, from a tiny pin to a towering building or a ship, all are made from minerals. All means of transport are manufactured from minerals and run on power resources derived from the earth. Even the food that we eat contains minerals. Human beings have used minerals for their livelihood, decorations, festivities and in all stages of development.

SUBJECTIVE TOPIC-2
Mode of Occurrence of Minerals

Short Answer Type Questions (SA-I) (Easy) (1 Mark)

5. Define the term 'ore'.

Ans. The term **'ore'** is used to describe an accumulation of any mineral mixed with other elements.

6. How do minerals occur in igneous and metamorphic rocks? (2016 *Delhi*)

Ans. In igneous and metamorphic rocks, minerals may occur in cracks, crevices, faults and joints.

7. How do minerals occur in sedimentary rocks? (2015 *Outside Delhi*)

Ans. In sedimentary rocks a number of minerals occur in beds or layers. They have been formed as a result of deposition, accumulation and concentration in horizontal strata. *For example,* coal, iron ore.

Long Answer Type Questions (LA) (Difficult) (5 Marks)

8. What are the main types of formations in which minerals occur?

Ans. ***Minerals generally occur in the following forms:***

(*i*) **Veins and lodes.** In igneous and metamorphic rocks minerals may occur in the cracks, faults or joints by getting solidified in them. The smaller occurrences are called veins and the larger **lodes**, *for example*, metallic minerals like tin, copper, zinc and lead etc. are found in lodes and veins.

(*ii*) In sedimentary rocks minerals occur in **beds or layers**. They are formed as a result of deposition, accumulation and concentration in horizontal strata. Some sedimentary minerals are formed as a result of **evaporation**, especially in arid regions, *for example*, gypsum, potash and salt.

(*iii*) Another mode of formation involves decomposition of surface rocks and the removal of soluble contents, leaving a **residual** mass of weathered material containing ores. Bauxite is formed this way.

(*iv*) **Placer deposits.** Certain minerals occur as alluvial deposits in sands of valley floors and the base of hills, *for example*, gold, silver, tin and platinum. These are called placer

deposits and contain minerals which are not corroded by water.

(v) **Ocean waters** contain vast quantities of minerals, *for example*, common salt, magnesium and bromide are largely derived from the ocean waters. The **ocean beds** are rich in manganese nodules.

SUBJECTIVE TOPIC-3
Ferrous and Non- Ferrous Minerals

Short Answer Type Questions (SA-I) (Easy) (1 Mark)

9. Name the finest quality of iron ore. (2011 *Delhi*)

Ans. Magnetite is the finest quality of iron ore.

10. Odisha is the leading producer of which mineral? (2011 *Outside Delhi*)

Ans. Manganese ore

11. Which mineral is formed by decomposition of rocks, leaving a residual mass of weathered material? (2014 *Delhi*)

Ans. Bauxite

12. In which State are the 'Balaghat' Copper mines located? (2014 *Delhi*)

Ans. Madhya Pradesh

Short Answer Type Questions (SA-II) (Average) (2-3 Marks)

13. Mention any *three* major iron-ore belts of India. Write any *three* characteristics of the southern most iron-ore belt. (2012 *Delhi*)

Ans. ***The three major iron-ore belts of India are:***

(i) Odisha-Jharkhand belt.

(ii) Durg-Bastar-Chandrapur belt in Chhattisgarh and Maharashtra.

(iii) Ballari-Chitradurga-Chikkamagaluru-Tumakuru belt in Karnataka.

(iv) Maharashtra-Goa belt.

Bellari-Chitradurga-Chikkmagluru-Tumkuru belt is the southern most iron-ore belt.

Characteristics:

(i) This belt in Karnataka has large reserves of iron-ore.

(ii) Kudremukh mines in the Western Ghats are known to be one of the largest in the world.

(iii) Kudremukh is a 100 per cent export unit and the ore is transported as slurry through a pipeline to a port near Mangalore.

14. Mention any *three* characteristics of ferrous group of minerals found in India. (2011 *Delhi*)

Ans. Metallic minerals that have iron in them are called **ferrous minerals**. *For example*, iron ore, manganese, nickel, cobalt etc.

Three characteristics of ferrous group of minerals found in India are:

(i) Ferrous minerals account for about 3/4ths of the total value of the production of metallic minerals.

(ii) They provide a strong base for the development of metallurgical industries.

(iii) India exports substantial quantities of ferrous minerals to Japan and South Korea after meeting her internal demands.

15. Differentiate between ferrous and non-ferrous minerals with examples. (2013 *Delhi*)

Ans. ***Ferrous minerals:***

(i) Ferrous minerals account for about three-fourths of the total value of the production of metallic minerals.

(ii) They provide a strong base for the development of metallurgical industries. *For example*, iron ore, manganese, nickel and cobalt.

(iii) India exports substantial quantities of ferrous minerals to Japan and South Korea after meeting her internal demands.

Non-ferrous minerals:

(i) India's reserves and production of non-ferrous minerals is not very satisfactory.

(ii) Non-ferrous minerals include copper, bauxite, lead, zinc and gold.

(iii) Non-ferrous minerals provide a strong base for the development of metallurgical, engineering and electrical industries.

(iv) Non-ferrous minerals like copper and bauxite are mainly found in Madhya Pradesh and Odisha respectively.

16. What is the use of manganese? Name the largest manganese-ore producing state of India. (2012 *D*)

Ans. ***Manganese is mainly used in the manufacturing of the following items:***

(i) Steel (nearly 10 kg of manganese is required to manufacture 1 tonne of steel).

(ii) Ferro-manganese alloy

(iii) Bleaching powder

(iv) Insecticides and paints

Odisha is the largest producer of manganese ore in India.

Related Concept

Major reserves of manganese in India are in Karnataka, followed by Odisha, Madhya Pradesh, Maharashtra and Goa.

SUBJECTIVE TOPIC-4
Rock and Non-Metallic Minerals

Short Answer Type Questions (SA-I) (Easy) (1 Mark)

17. Which rock consists of a single mineral only? (2015 *Delhi*)

Ans. Limestone consists of a single mineral only.

18. Name the industry which uses limestone as its main raw material. (2010 *Delhi*)

Ans. Cement industry.

Related Concept

Limestone is used extensively in road and building construction, and is a material found in aggregate, cement, building stones, chalk and crushed stone.

Short Answer Type Questions (SA-II) (Average) (2-3 Marks)

19. How is the mining activity injurious to the health of the miners and environment? Explain. (2015 *Delhi*)

Ans. ***Adverse effect on health.*** The dust and noxious fumes inhaled by miners make them vulnerable to pulmonary diseases.

The risk of collapsing mine roofs, inundation and fires in coal mines are a constant threat to miners.

Adverse effects on the environment:

The water sources in the region get contaminated due to mining.

Dumping of slurry and waste leads to degradation of land, soil and increase in stream and river pollution. Stricter safety regulations and implementation of environmental laws are essential to prevent mining from becoming a '*killer industry*'.

20. Differentiate between metallic and non-metallic minerals with examples. (2013 *Delhi*)

Ans. ***Metallic minerals and Non-metallic minerals:***

Metallic minerals	Non-metallic minerals
(*i*) Metallic minerals generally occur in igneous and metamorphic rocks. Certain minerals may also occur as alluvial deposits in sands of valley floor and base of hills.	(*i*) Non-metallic minerals occur in sedimentary rocks. They have been formed as a result of deposition, accumulation and concentration in the horizontal strata.
(*ii*) Metallic minerals comprise of ferrous minerals, non-ferrous minerals and precious metals. Ferrous minerals containing iron-ore, cobalt, account for strong development of metallurgical industries. Non-ferrous minerals, *e.g.*, copper, bauxite and precious metals, *e.g.*, gold, platinum and silver play a vital role in metallurgical engineering and electrical industries.	(*ii*) Non-metallic minerals comprise of mica, salt, limestone, granite, etc. Limestone is used as raw material in cement industries. Mica, salt and granite are indispensable minerals used in electric and electronic industries.
(*iii*) Metallic minerals are found in Odisha, Chhattisgarh and Maharashtra.	(*iii*) Non-metallic minerals are found in Rajasthan, Jharkhand and Andhra Pradesh.

SUBJECTIVE TOPIC-5
Conservation of Minerals

Long Answer Type Questions (LA) (Difficult) (5 Marks)

21. Why is it necessary to conserve mineral resources? Suggest any *four* ways to conserve mineral resources. (2013 *Outside Delhi*, 2012 *Outside Delhi*, 2017 *Outside Delhi*)

***Or,* Explain the importance of conservation of minerals. Highlight any *three* measures to conserve them.** (2016 *Outside Delhi*)

Ans. ***Conservation of minerals is necessary because of the following reasons:***

(*i*) The formation of minerals takes a long geological period of millions of years.

(*ii*) They are finite, *i.e.*, limited in nature.

(*iii*) Many of them are non-renewable and exhaustible.

(*iv*) The rate of replenishment of minerals is infinitely small in comparison to rate of consumption.

(v) They have to be preserved for our future generations because they are very important for industrial development of the nation.

Ways to mineral conservation:

(i) We should use minerals in a planned and sustainable manner.

(ii) Improved technologies need to be evolved to allow use of low grade ores at low cost.

(iii) Recycling of metals should be done.

(iv) Using scrap metals and other substitutes should be promoted.

(v) Wastages in mining, processing and distribution should be minimized.

(vi) Controlled export of minerals should be undertaken.

SUBJECTIVE TOPIC-6

Energy Resources (Conventional and Non-Conventional)

Short Answer Type Questions (SA-I) (Easy) (1 Mark)

22. Classify energy resources into two categories. Give *two* examples of each. (2012 *Delhi*)

Ans. Energy resources can be classified as **conventional** and **non-conventional** sources.

Conventional sources include—firewood, cattle-dung cake, coal, petroleum, natural gas, etc.

Non-conventional sources include—solar, wind, tidal, geothermal energy and biogas.

23. Which is the main source of energy in India? (2012 *Delhi*)

Ans. The main source of energy in India is fossil fuels, especially coal.

24. Which is the most abundantly available fossil fuel in India? Name its *four* major forms. (2014 *Delhi*)

Ans. ***Most abundantly available fossil fuel in India:*** Coal

Four major forms of coal: (*i*) Anthracite, (*ii*) bituminous, (*iii*) Lignite and (*iv*) peat.

25. Name *one* fossil fuel which is considered environment friendly. (2012 *Delhi*)

Ans. Natural gas

26. In which non-conventional source of energy is India referred to as a super power? (2013 *Delhi*)

Ans. Wind Power

27. Name the state where the largest wind farm cluster is located? (2014 Delhi)

Ans. Tamil Nadu

28. Why should the use of cattle cake as fuel be discouraged? (2016 *Outside Delhi*)

Ans. Using dung cake or cattle cake as fuel is being discouraged because it consumes most valuable manure which could be used in agriculture.

29. How are 'Gobar gas plants' beneficial to the farmers? (2016 *Outside Delhi*)

Ans. "Gobar Gas Plants" are beneficial to the farmers in the form of energy and improved quality of manure.

30. Where is the largest solar plant located in India? (2009 *Outside Delhi*)

Ans. The largest solar plant is located at Madhapur near Bhuj in Gujarat.

Short Answer Type Questions (SA-II) (Average) (2-3 Marks)

31. Why is energy required for all activities? How can energy be generated? Explain. (2014 *Delhi*)

Ans. Energy is needed to cook, to provide light and heat, to propel vehicles and to drive machinery in industries. Energy is a basic requirement for economic development. Every sector of the national economy—agriculture, industry and transport—commercial and domestic needs inputs of energy.

Energy can be generated from fuel minerals like coal, petroleum, natural gas, uranium and from electricity. Conventional sources like firewood and cattle dung cakes are most commonly used in rural India to generate energy.

32. Explain the use of petroleum as an energy resource and as an industrial raw material. (2011 *Outside Delhi*)

Ans. ***The use of petroleum as a source of energy:***

(i) It is used as a fuel for internal combustion engines in automobiles.

(ii) It is used as a fuel for railways and aircrafts.

(iii) It provides fuel for heat and lighting.

The use of petroleum as an industrial raw material:

(i) It is used as lubricant for machinery.

(ii) It is used as raw material for a number of manufacturing industries, *for example*, chemical industry.

(iii) Its numerous by-products are used in petrochemical industries such as fertilizers, synthetic rubber, synthetic fibre, medicines, vaseline wax, soap, cosmetics etc.

33. Natural gas is considered an environmental friendly fuel. Suggest and explain any *three* ways to make it popular. (2020 *Series: JBB/3*)

Ans. Natural gas is used as a source of energy as well as an industrial raw material. It is an environment-friendly fuel because of the low carbon emission and is popular as fuel for automobiles as CNG.

(*i*) Since it can be transported easily through pipelines. A large supply network will make it easily available in the whole country. Natural gas can be used as a cooking and heating fuel. More and more households should be connected by pipelines for its domestic consumption.

(*ii*) Natural gas is a clean source of energy and the Government should encourage its use by making the citizens aware with the help of advertisements and live promotions.

(*iii*) It can be used to generate electricity, fuel vehicles, power industrial furnaces and it can even run air-conditioners. The production of all such appliances and vehicles should be promoted.

Long Answer Type Questions (LA) (Difficult) (5 Marks)

34. Which is the most abundantly available fossil fuel in India? Mention its different forms. (2008, 2014 *Outside Delhi*, 2015 *Outside Delhi*)

Ans. The most abundantly available fossil fuel is ***Coal.***

There are four types of coal:

(*i*) **Anthracite.** It is the highest quality hard coal. It contains more than 80% carbon content. It gives less smoke.

(*ii*) **Bituminous.** It is the most popular coal in commercial use and has 60-80% carbon content. Metallurgical coal is high grade bituminous coal and is of special value for smelting iron in blast furnaces.

(*iii*) **Lignite.** It is a low grade brown coal. It is soft with high moisture content.

(*iv*) **Peat.** It has a low carbon and high moisture content. It has low heating capacity and gives lot of smoke on burning.

35. Highlight the importance of petroleum. Explain the occurrence of petroleum in India. (2016 *D*)

***Or,* Which is the next major source of energy after coal in India? Describe any *three* advantages of it.** (2008, 2017 *Outside Delhi*)

Ans. ***Importance of Petroleum in India:***

(*i*) It is the second most important energy source of India after coal. It can be easily transported by pipelines and does not leave any residue. This property of petroleum gives it an added advantage in its use over other fuels.

(*ii*) It provides fuel for heat and light.

(*iii*) It provides lubricants for machinery.

(*iv*) It provides raw material for a number of manufacturing industries.

(*v*) It is an important fuel used in transportation sector.

(*vi*) Petroleum refineries act as a 'nodal industry' for synthetic textiles, fertilizers and many chemical industries.

Occurrence of Petroleum in India:

(*i*) Most of the petroleum occurrences in India are associated with anticlines and fault traps in the rock formations of the tertiary age.

(*ii*) In regions of folding anticlines it occurs where oil is trapped in the crest of the upfold. The oil bearing layer is porous limestone or sandstone through which oil may flow.

(*iii*) Petroleum is also found in fault traps between porous and non-porous rocks.

36. How can solar energy solve the energy problem to some extent in India? Give your opinion. (2015 *Outside Delhi*)

***Or,* Why does solar energy have a bright future in India?**

Ans. ***Reasons:***

(*i*) India is a tropical country and gets abundant sunshine.

(*ii*) It has enormous possibilities of tapping solar energy.

(*iii*) It is an inexhaustible source of energy which is freely available in nature.

(*iv*) It is a cheaper source of energy and is fast becoming popular in rural and remote areas.

(*v*) Photovoltaic technology is available which converts sunlight directly into electricity.

(*vi*) Because of its abundant and free availability in all parts of India in addition to its eco friendly nature, solar energy is called the energy of future.

Also use of solar energy will minimise the dependence of rural households on firewood. It will contribute to environmental conservation and reduce pressure on conventional sources of energy.

37. Make a distinction between hydroelectricity and thermal electricity stating *three* points of distinction.

***Or,* What are the *two* main ways of generating electricity? How are they different from each other. Explain.** (2011 *Outside Delhi*, 2014 *Outside Delhi*)

Ans. ***Electricity is generated mainly in two ways:***

(*i*) By running water which drives hydro turbines to generate hydro electricity.

(*ii*) By burning other fuels such as coal, petroleum and natural gas to drive turbines to produce thermal power.

Hydroelectricity	*Thermal electricity*
(*i*) Hydroelectricity is generated by fast flowing water which drives turbines to generate electricity.	(*i*) Thermal electricity is generated by burning coal, petroleum and natural gas.
(*ii*) It is a renewable resource and is cheap.	(*ii*) The thermal power stations use non-renewable fossil fuels.
(*iii*) India has a number of multipurpose projects like the Bhakra Nangal, Damodar Valley Corporation, etc. producing hydroelectric power.	(*iii*) There are over 310 thermal power plants in India.

38. Distinguish between conventional and non-conventional sources of energy. (2013 *Delhi*)

***Or,* Classify energy resources into two categories. Give *two* examples of each.** (2014 *Outside Delhi*)

Ans. Energy sources can be classified as conventional and non-conventional sources of energy.

Difference between Conventional and Non-conventional sources of energy

Conventional	*Non-Conventional*
(*i*) They have been in use since ages.	(*i*) The technology for their large-scale development is relatively new.
(*ii*) Except hydel power they are exhaustible or non-renewable, *for example*, coal, petroleum and natural gas.	(*ii*) They are inexhaustible sources of energy, *for example,* solar, wind and tidal energy.
(*iii*) The non-renewable resources create pollution.	(*iii*) These are pollution-free, therefore are eco friendly.
(*iv*) Except water, all other sources of energy are available in limited quantities.	(*iv*) These are freely and abundantly available in nature.
(*v*) It is costly.	(*v*) It is a cheaper source.
(*vi*) Because of their limited availability and exhaustible nature, we cannot depend on them for times to come.	(*vi*) Because of their abundant availability, they are dependable sources. Therefore, they are called our future energy resources.

SUBJECTIVE TOPIC-7
Conservation of Energy Resources

Short Answer Type Questions (SA-II) (Average)
(2-3 Marks)

39. How is energy an indispensable requirement of our modern life? Explain with *three* examples. (2011 *Delhi*)

Ans. Energy is required for all activities. It is needed to cook, to provide light and heat, to propel vehicles and to drive machinery in industries. Modern life is highly governed by technology and revolves around it. Modern technology is driven by energy and is highly automated. Every sector of National economy—agriculture, industry, transport and commerce need greater inputs of energy. In the domestic sector also, energy demands, in the form of electricity, are growing because of increasing use of electric gadgets and appliances. Energy is the basic requirement for economic development.

40. Explain any *three* steps to be taken to conserve the energy resources. (2011 *Outside Delhi*)

Ans. (*i*) We need to develop a sustainable path of energy development, *i.e.,* increased use of renewable or non-conventional energy resources.

(*ii*) We have to adopt a cautious approach for the judicious use of our limited energy resources.

(*iii*) As concerned citizens we can do our bit by using public transport systems instead of

individual vehicles, switching off electricity when not in use, using power saving devices etc.

41. Suggest and explain any *three* ways to reduce the use of petrol. (2020 *Series: JBB/3*)

Ans. (*i*) Bicycles should be used for covering short distances to save fuel. People should travel in public transport system instead of taking private cars and can also make car-pools.

(*ii*) Engines of vehicles should be designed to reduce the consumption of petrol and diesel.

(*iii*) Avoiding the idling whenever possible. If a vehicle remains stationary for more than a minute then it is better to switch off the engine like at the red light.

(*iv*) Reduced toll fee for vehicles powered by natural gas.

Long Answer Type Questions (LA) (Difficult) (5 Marks)

42. In the present day energy crisis what steps will you like to take for saving energy? (2015 *Delhi*)

***Or,* Why is energy needed? How can we conserve energy resources? Explain.** (2015 *Delhi*)

***Or,* How is energy a basic requirement for the economic development of the country? Explain with examples.** (2013 *Outside Delhi*)

Ans. Energy is required for all activities. It is needed to cook, to provide light and heat, to propel vehicles and to drive machinery in industries.

(*i*) Energy is the basic requirement for economic development.

(*ii*) Every sector of national economy—agriculture, industry, transport and commerce needs greater inputs of energy.

(*iii*) In the domestic sector also, energy demands, in the form of electricity, are growing because of increasing use of electrical gadgets and appliances.

(*iv*) The economic development plans implemented since independence necessarily required increasing amounts of energy.

(*v*) Because of all these, per capita consumption of energy is continuously increasing.

We have to adopt a cautious approach for the judicious use of our limited energy resources. So conservation of energy should be done at all levels. Increased use of renewable energy resources, *for example,* solar energy, hydel power, etc.

We, as concerned citizens can help conserve energy in the following ways:

(*i*) Using more of public transport system instead of individual vehicles.

(*ii*) Switching off electrical devices when not in use.

(*iii*) Using power saving devices.

(*iv*) Using non-conventional sources of energy such as solar energy, wind energy, etc.

(*v*) Getting the power equipment regularly checked to detect damages and leakages.

43. "Consumption of energy in all forms has been rising all over the country. There is an urgent need to develop a sustainable path of energy development and energy saving." Suggest and explain any *three* measures to solve this burning problem. (2016 *Outside Delhi*)

***Or,* "There is an urgent need to develop a sustainable path of energy development." Give *two* broad measures for it. As concerned citizens, how can you help conserve energy?** (2012 *Delhi*, 2011 *Outside Delhi*)

Ans. Every sector of the national economy—agriculture, industry, transport, (commercial and domestic), needs greater inputs of energy.

With increasing population and changing lifestyles energy consumption is increasing very fast. We are not self-sufficient in energy according to demands. Therefore we have to adopt a cautious approach for the judicious use of our limited resources. Conservation of energy should be done at all levels.

Two broad measures to develop a sustainable path of energy development are:

(*i*) We have to adopt a cautious approach for the judicious use of our limited energy resources. So conservation of energy should be done at all levels.

(*ii*) Increased use of renewable energy resources, *for example*, solar energy, hydel power, etc.

Three measures to reduce consumption of energy in all forms:

(*i*) We can do our bit by using public transport system instead of individual vehicles.

(*ii*) Switching off electricity when not in use.

(*iii*) Using power saving devices or using non-conventional sources of energy such as solar energy, wind energy, etc.

(*iv*) Checking the power equipments regularly to detect damages and leakages that can help in saving of energy.

44. Why is there a pressing need to use renewable energy resources in India? Explain any *five* reasons. (2013 *Outside Delhi*)

***Or,* Why is there a pressing need to use non-conventional sources of energy in India? Explain any *three* reasons.** (2011 *Delhi*)

Ans. (*i*) The growing consumption of energy has resulted in India becoming increasingly dependent on fossil fuels such as coal, oil and gas which are found in limited quantities on the earth. So there is an urgent need to use sustainable energy resources like solar power, water, wind etc.

(*ii*) Rising prices of oil and gas and their potential shortages have raised uncertainties about the security of energy supply in future, which in turn has serious repercussions on the growth of the national economy.

(*iii*) Increasing use of fossil fuels also causes serious environmental degradation like air pollution, water pollution etc.

(*iv*) Renewable sources of energy are pollution-free and do not cause harm to ozone, therefore they are eco friendly.

(*v*) They are a cheaper source and are freely and abundantly available in nature.

45. 'Energy saved is energy produced.' Assess the statement. (2017 *Delhi*)

Ans. Energy saved is energy produced. We cannot keep on producing non-renewable resources like petrol, diesel and electricity. So the need of the hour is the better utilization of existing resources. Energy depletion has become a global phenomenon at present time. The biggest problem that man has to face in near future is the energy crisis. The demand of energy is growing manifold in the form of coal, oil, gas or electricity but the energy sources are becoming scarce and costlier. Nearly 97% of the world's consumed energy is coming from fossil fuels, coal, petroleum and natural gas. Among the various strategies for meeting energy demand, the efficient use of energy and its conservation is the best solution.

Following are some measures to conserve energy resources:

(*i*) We should try and use more and more public transport system instead of private vehicles.

(*ii*) Electronic devices must be switched off when not in use.

(*iii*) Reducing the consumption of non-renewable sources of energy.

(*iv*) Solar Power should be used to the maximum to generate electricity.

(*v*) Recycling of goods and commodities can also help to conserve energy.

2024 CBSE BOARD EXAMINATION

Questions

SCAN ME! FOR ANSWERS

— 2024 (Series: AB3CD/1) Set-I —

Q.5. Choose the correctly matched pair. 1

(*a*) Ferrous — Natural Gas
(*b*) Non–Ferrous — Nickel
(*c*) Non–Metallic Minerals — Limestone
(*d*) Energy Minerals — Cobalt

Q.31. (*a*) How is energy a basic requirement for economic development? Explain. 5

Or, (*b*) How are conventional sources of energy different from non–conventional sources? Explain. 5

2024 (Series: AB3CD/1) Set-II

Q.31. (*a*) How is the per capita consumption of electricity considered as an index of development? Explain with examples. 5

Or, (*b*) Explain with examples the significance of the usage of non–conventional sources of energy for the country. 5

2024 (Series: AB3CD/1) Set-III

Q.31. (*a*) Analyse the advantages of Natural Gas as a source of energy. 5

Or, (*b*) 'Minerals generally occur in different rocks.' Examine the statement. 5

— 2024 (Series: AABB1/3) Set-I —

Q.2. Match Column–I with Column–II and choose the correct option. 1

Column–I (Minerals)	*Column–II (Examples)*
I. Ferrous	(A) Coal
II. Non–Ferrous	(B) Granite
III. Non–Metallic	(C) Bauxite
IV. Energy	(D) Cobalt

Options:

	I	II	III	IV
(*a*)	(B)	(D)	(C)	(A)
(*b*)	(D)	(C)	(B)	(A)
(*c*)	(A)	(B)	(D)	(C)
(*d*)	(C)	(D)	(B)	(A)

Competency Based Questions

Stand Alone Multiple Choice Questions

1 mark

1. **Minerals are deposited and accumulated in the stratas of which of the following rocks?**
   (a) Sedimentary rocks (b) Igneous rocks
   (c) Metamorphic rocks (d) None of the above
2. **In which of the following states is Kalpakkam Nuclear Power Plant located?**
   (a) Gujarat (b) Odisha
   (c) Kerala (d) Tamil Nadu
3. **Which one of the following is a ferrous metal?**
   (a) copper (b) manganese
   (c) coal (d) bauxite
4. **Which one of the following is a non-metal?**
   (a) gold (b) silver
   (c) mica (d) platinum
5. **Large occurrences of minerals in cracks, crevices, faults in igneous and metamorphic rocks are called:**
   (a) Layers (b) Veins
   (c) Lodes (d) Chamber
6. **Mineral deposits that occur as alluvial deposits in sands of valley floors are called:**
   (a) Placer deposits (b) Lodes
   (c) Reserve (d) Layers
7. **How many kilograms of manganese is required to manufacture one tonne of steel?**
   (a) 2 kgs (b) 11 kgs
   (c) 10 kgs (d) 20 kgs
8. **Most of India's mineral reserves are found in:**
   (a) Himalayan region (b) Coastal region
   (c) Peninsular rocks (d) None of the above
9. **Which is the finest quality iron ore in terms of iron content?**
   (a) Hematite (b) Magnetite
   (c) Siderite (d) Limonite
10. **Which state is the largest producer of manganese ore in India?**
    (a) Karnataka (b) Madhya Pradesh
    (c) Odisha (d) West Bengal
11. **Which among the following is a 100 per cent 'export-oriented' iron ore mine of India?**
    (a) Kendujhar in Orissa
    (b) Bailadila range of Chhattisgarh
    (c) Ratnagiri of Maharashtra
    (d) Kudremukh mines of Karnataka
12. **India is deficient in which of the following minerals?**
    (a) Iron ore (b) Coal
    (c) Copper (d) Mica

Related Concept

Minerals can be identified based on a number of properties. The properties most commonly used in identification of a mineral are colour, lustre, hardness, crystal shape, cleavage, specific gravity etc. Most of these can be assessed relatively easily even when a geologist is out in the field.

13. **Which of the following are copper mines of India?**
    (a) Ratnagiri and Bailadila
    (b) Jharia and Raniganj
    (c) Balaghat and Khetri
    (d) Tarapur and Kakrapara
14. **Which was the largest bauxite producing state of India in 2016-17?**
    (a) Odisha (b) Goa
    (c) Sikkim (d) Bihar
15. **Limestone is the basic raw material of:**
    (a) Paper industry (b) Cement industry
    (c) Sugar industry (d) Textile industry
16. **Balaghat mines in Rajasthan are famous for:**
    (a) Iron ore (b) Mica
    (c) Copper (d) Limestone
17. **Mica is used in electric and electronic industries because:**
    (a) of its insulating properties and resistance to high voltage.
    (b) it is a good conductor of electricity.
    (c) of its great malleability.
    (d) of its sonorous nature
18. **Gondwana coal deposits are found in:**
    (a) Ganga valley (b) Damodar valley
    (c) Kaveri delta (d) Narmada valley
19. **Which one of the following is an example of the Ferrous Metal?** (2023)
    (a) Copper (b) Tin
    (c) Bauxite (d) Nickel

Related Concept

Ferrous metals refer to any metal that contains iron. They are known for their tensile strength and durability, so are often utilised in housing construction, large-scale piping and industrial containers.

GEOGRAPHY

Assertion-Reason Questions — 1 mark

DIRECTION: There are two statements marked as **Assertion (A)** and **Reason (R)**. Read the statements and choose the correct option:

(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

(c) Assertion is true but Reason is false.

(d) Both Assertion and Reason are false.

1. **Assertion.** Uses of iron brought a radical change in human life.
   Reason. Different kinds of tools where invented by using minerals.
2. **Assertion.** Iron-ore is the basic mineral and the backbone of Industry in India.
   Reason. India is rich in good quality Iron-ore.
3. **Assertion.** Minerals are an indispensable part of our lives.
   Reason. Minerals have a universal use, they are used to manufacture everything we use in our day to day lives.
4. **Assertion.** Thermal power stations are located on or near the coalfields.
   Reason. Coal is a bulky material, which loses weight on use as it is reduced to ash.
5. **Assertion.** Increased use of fossil fuels creates a healthy environment.
   Reason. Fossil fuels such as coal, oil and gas are easily obtained from natural resources.
6. **Assertion.** Mining is often called a "Killer Industry".
   Reason. Mining helps in agriculture.
7. **Assertion.** Mica is one of the most important minerals used in electronic industry.
   Reason. Mica can be red, yellow, green, black or brown.
8. **Assertion.** Geological process of mineral formation is slow.
   Reason. Mineral resources are consumed very quickly than they are formed.
9. **Assertion.** Natural gas is referred as an environment friendly fuel.
   Reason. Natural gas contains low carbon dioxide emissions.
10. **Assertion.** Conservation of Energy Resources is essential.
    Reason. Energy is a basic requirement for economic development.

Match the Columns — 1 mark

1.

Column-A	Column-B
(a) Mica	(i) Aircraft industry
(b) Limestone	(ii) Electronics industry
(c) Copper	(iii) Thermal power
(d) Coal	(iv) Iron Smelting
(e) Bituminous coal	(v) Bleaching powder
(f) Manganese	(vi) Cables
(g) Aluminium	(vii) Cement industry

2.

Column-A	Column-B
(a) Copper	(i) Mumbai High
(b) Coal	(ii) Malanjkhand
(c) Bauxite	(iii) Kudremukh
(d) Lignite	(iv) Jharia
(e) Iron Ore	(v) Bilaspur-Katni
(f) Petroleum	(vi) Neyveli
(g) Natural gas	(vii) Andaman and Nicobar Islands

3.

Column-A	Column-B
(a) Naturally occurring substance with a definite internal structure.	(i) Veins
(b) Natural accumulation of metals in a concentrated form along with other element.	(ii) Mineral
(c) Smaller occurrences of minerals in cracks, faults and joints in igneous and metamorphic rocks.	(iii) Placer deposit
(d) Gold, silver, platinum etc. occur as alluvial deposits in sands of valley floors and the base of hills.	(iv) Tidal energy
(e) The heat and electricity produced by using the heat from the interior of the earth.	(v) Ore
(f) Electricity generated from ocean's tides.	(vi) Geothermal energy

Case/Source Based Questions

4-5 marks

I. The earth's crust is made up of different minerals embedded in the rocks. Various metals are extracted from these minerals after proper refinement. Minerals are an indispensable part of our lives. Almost everything we use, from a tiny pin to a towering building or a big ship, all are made from minerals. The railway lines and the tarmac (paving) of the roads, our implements and machinery too are made from minerals. Cars, buses, trains, aeroplanes are manufactured from minerals and run on power resources derived from the earth. Even the food that we eat contains minerals. In all stages of development, human beings have used minerals for their livelihood, decoration, festivities, religious and ceremonial rites.

Answer the following Questions by choosing the most appropriate option:

1. **Who studies minerals as part of the earth's crust for a better understanding of land forms?**
   (a) Geologists (b) Biologists
   (c) Scientists (d) Geographers
2. **Our mineral intake represents only .....% of our total intake of nutrients as without them we are not able to utilize the other .....% of foodstuff.**
   (a) 0.1; 99.7 (b) 0.4; 99
   (c) 0.3; 99.7 (d) 0.3; 99.8
3. **A particular mineral that will be formed from a certain combination of elements depends upon the ..... and ..... conditions.**
   (a) Physical and Biological
   (b) Climatic and Chemical
   (c) Biological and Physical
   (d) Physical and Chemical
4. **"Minerals are an indispensable part of our lives." Which of following examples correctly justifies the above statement?**
   (a) Cars, Buses, trains and aeroplanes are manufactured from minerals.
   (b) Toothpastes that clean our teeth are made up of minerals.
   (c) Minerals are used to make a light bulb.
   (d) (a), (b) and (c)

Related Concept

Each mineral is classified by both its chemical composition (the elements from which it is formed) and crystal structure (the pattern the atoms form when they lock together). For e.g., Graphite and diamond are made of the same element, carbon, but have different crystal shapes so are different minerals.

II. Minerals are usually found in "ores". The term ore is used to describe an accumulation of any mineral mixed with other elements. The mineral content of the ore must be in sufficient concentration to make its extraction commercially viable. The type of formation or structure in which they are found determines the relative ease with which mineral ores may be mined. This also determines the cost of extraction.

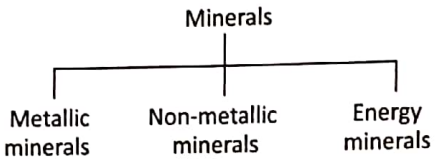
India is fortunate to have fairly rich and varied mineral resources. However, these are unevenly distributed. Broadly speaking, peninsular rocks contain most of the reserves of coal, metallic minerals, mica and many other non-metallic minerals. Sedimentary rocks on the western and eastern flanks of the peninsula, in Gujarat and Assam have most of the petroleum deposits. Rajasthan with the rock systems of the peninsula, has reserves of many non-ferrous minerals. The vast alluvial plains of north India are almost devoid of economic minerals. These variations

exist largely because of the differences in the geological structure, processes and time involved in the formation of minerals.

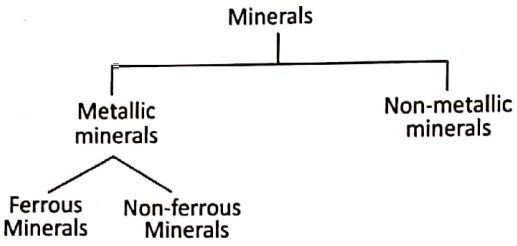
Answer the following Questions by choosing the most appropriate option:

5. Which of the following is a correct classification of minerals and their subtype.

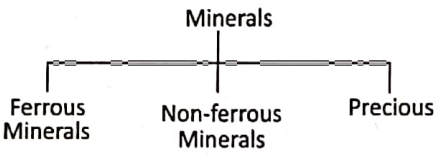
(a)



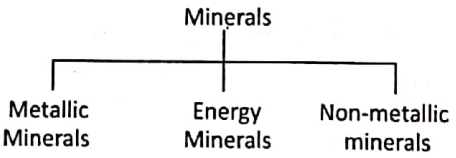
(b)



(c)



(d)



6. Large occurrences of minerals in cracks, crevices, faults in igneous and metamorphic rocks are called:

(a) Layers **(b)** Veins
(c) Lodes **(d)** Chamber

7. Match the definitions given in Column-A with the terms in Column-B.

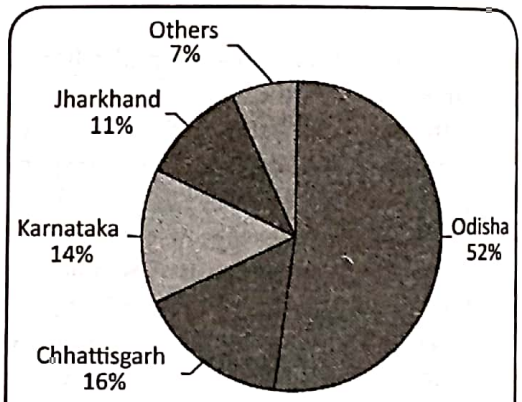
Column-A	Column-B
(A) Smaller occurrences of minerals in cracks, faults and joints in igneous and metamorphic rocks.	(*i*) Placer Deposits
(B) Extraction of coal mining in the form of a long narrow tunnel.	(*ii*) Veins
(C) Certain minerals occur as alluvial deposits in sand of valley floors and the base of hills.	(*iii*) Rat hole

(a) (A)–(*iii*); (B)–(*ii*); (C)–(*i*)
(b) (A)–(*ii*); (B)–(*iii*); (C)–(*i*)
(c) (A)–(*i*); (B)–(*ii*); (C)–(*iii*)
(d) (A)–(*iii*); (B)–(*i*); (C)–(*ii*)

8. Which of the following is the reason for the conservation of minerals?

(a) These take a long geological period or millions of years to form.
(b) They are infinite in nature.
(c) These are renewable and can be recycled.
(d) Both (*b*) and (*c*)

III. Iron ore is the basic mineral and the backbone of industrial development. India is endowed with fairly abundant resources of iron ore. India is rich in good quality iron ores. Magnetite is the finest iron ore with a very high content of iron up to 70%. It has excellent magnetic qualities, especially valuable in the electrical industry. Hematite ore is the most important industrial iron ore in terms of the quantity used, but has a slightly lower iron content than magnetite (50-60 per cent).



Production of iron-ore showing state-wise share in per cent

Study the given graph carefully and answer the questions that follow:

9. Which of the following states has highest share in the production of iron-ore?

(a) Karnataka **(b)** Chhattisgarh
(c) Odisha **(d)** Jharkhand

10. Match the major iron ore belts in India with the respective states.

Column-A	Column-B
(A) Odisha-Jharkhand belt	(*i*) Karnataka
(B) Durgapur-Bastar-Chandrapur belt	(*ii*) Goa and Ratnagiri
(C) Ballari-Chitradurga-Chikkamagaluru-Tumakuru belt	(*iii*) Mayurbhanj and Kendujhar districts
(D) Maharashtra-Goa belt	(*iv*) Chhattisgarh and Maharashtra

(a) (A)–(*iii*); (B)–(*iv*); (C)–(*i*); (D)–(*ii*)
(b) (A)–(*ii*); (B)–(*iii*); (C)–(*iv*); (D)–(*i*)

(c) (A)–(*i*); (B)–(*ii*); (C)–(*iii*); (D)–(*iv*)
(d) (A)–(*iv*); (B)–(*iii*); (C)–(*ii*); (D)–(*i*)

11. Which is correct about magnetite iron ore?
(a) Magnetite is the most important individual iron ore in the terms of quantity used.
(b) Magnetite has the inferior magnetic qualities which is not valuable in the electric industry.
(c) It has a slightly lower iron content than Haematite (50-60%).
(d) It is the finest iron ore with a very high content of iron upto 70%.

12. The best quality of iron ore is:
(a) Magnetite (b) Pyrite
(c) Hematite (d) Siderite

IV. Energy is a basic requirement for economic development. Every sector of the national economy —agriculture, industry, transport, commercial and domestic—needs inputs of energy. The economic development plans implemented since Independence necessarily required increasing amounts of energy to remain operational. As a result, consumption of energy in all forms has been steadily rising all over the country. In this background, there is an urgent need to develop a sustainable path of energy development. Promotion of energy conservation and increased use of renewable energy sources are the twin planks of sustainable energy. India is presently one of the least energy efficient countries in the world. We have to adopt a cautious approach for the judicious use of our limited energy resources. *For example,* as concerned citizens we can do our bit by using public transport systems instead of individual vehicles; switching off electricity when not in use, using power-saving devices and using non-conventional sources of energy.

Answer the following Questions by choosing the most appropriate option:

13. Which of the following is the feature of non-conventional sources of energy?
(a) They are available in limited quantities.
(b) It is costly source of energy.
(c) It is called our future energy resources.
(d) They have been used since ages.

14. Which of the following alternatives can we take in conserving our energy resources for future?
(a) Using public transport instead of individual vehicles.
(b) In automobiles electrical motors should be introduced.
(c) Use of power saving devices.
(d) All of these

15. An ideal source of energy should have:
(a) high calorific value. (b) easy transportability.
(c) easy accessibility. (d) All of these

16. "Consumption of energy in all forms has been steadily rising all over the Country" because:
(a) It is the basic requirement for economic development.
(b) Every sector of national economy needs greater inputs of energy.
(c) In the domestic sector energy demand increases because of increasing use of electric gadgets.
(d) All of these

V. In India, coal is the most abundantly available fossil fuel. It provides a substantial part of the nation's energy needs. It is used for power generation, to supply energy to industry as well as for domestic needs. India is highly dependent on coal for meeting its commercial energy requirements. Coal is formed due to the compression of plant material over millions of years. Coal, therefore, is found in a variety of forms depending on the degrees of compression and the depth and time of burial. Decaying plants in swamps produce peat. Which has a low carbon and high moisture content and low heating capacity.

Answer the following Questions by choosing the most appropriate option:

17. Match the characteristics of coal given in Column A with their types given in Column B.

Column A	Column B
(A) Anthracite	(*i*) It is a low grade brown coal.
(B) Bituminous	(*ii*) It has low carbon and high moisture content and low heating capacity.
(C) Lignite	(*iii*) It is most popular coal in commercial use.
(D) Peat	(*iv*) It is the highest quality hard coal.

(a) A–(*iv*); (B)–(*i*); (C)–(*ii*); (D)–(*iii*)
(b) A–(*iv*); (B)–(*iii*); (C)–(*i*); (D)–(*ii*)
(c) A–(*iii*); (B)–(*ii*); (C)–(*i*); (D)–(*iv*)
(d) A–(*ii*); (B)–(*iii*); (C)–(*iv*); (D)–(*i*)

18. Coal is an example of ..... source of energy.
(a) Conventional (b) Non-Conventional
(c) Both (*a*) and (*b*) (d) None of these

19. In India coal occurs in rock series of two main geological ages, namely ..... a little over 200 million years in age and in ..... deposits which are only about 55 million year old.

GEOGRAPHY

(a) Damodar Valley belt; Tertiary Coal
(b) Godavari Valley belt; Wardha Valley belt
(c) Gondwana Coal belt; Tertiary Coal
(d) Mahanadi Valley belt; Damodar Valley belt

20. The tertiary Coal deposits occur in North-Eastern states namely.
(a) Assam and Arunachal Pradesh
(b) Nagaland and Meghalaya
(c) Mizoram and Manipur
(d) Both (a) and (b)

VI. Minerals are an indispensable part of our lives. Almost everything we use, from a tiny pin to a towering building or a big ship, all are made from minerals. In all stages of development, human beings have used minerals for their livelihood, decoration, festivities, religious and ceremonial rites. A particular mineral that will be formed from a certain combination of elements depends upon the physical and chemical conditions under which the material forms. This, in turn, results in a wide range of colours, hardness, crystal forms, lustre and density that a particular mineral possesses. Geologists use these properties to classify the minerals.

Answer the following Questions by choosing the most appropriate option:

21. Mineral resources are ..... .
(a) finite and non-renewable
(b) infinite
(c) renewable
(d) plenty

22. Fluoride which is used in toothpaste to reduce cavities, comes from a mineral:
(a) Fluorite (b) rutile
(c) ilmenite (d) anatase

23. Sandstone is a ..... mineral.
(a) ferrous (b) non-ferrous
(c) precious (d) non-metallic

24. Who studies the formation of minerals, their age and physical and chemical composition?
(a) Geologists (b) Geographers
(c) Ecologists (d) Biologists

25. Where are minerals found?
(a) In rocks (b) In ores
(c) In metals (d) In chemicals

26. Name one property which geologists use to classify minerals?
(a) Area of recovery (b) Use
(c) Source (d) Density

VII. India is fortunate to have fairly rich and varied mineral resources. However, these are unevenly distributed. Broadly speaking, peninsular rocks contain most of the reserves of coal, metallic minerals, mica and many other non-metallic minerals. Sedimentary rocks on the western and eastern flanks of the peninsula, in Gujarat and Assam have most of the petroleum deposits. Rajasthan with the rock systems of the peninsula, has reserves of many non-ferrous minerals. The vast alluvial plains of north India are almost devoid of economic minerals.

Answer the following Questions by choosing the most appropriate option:

27. India's reserves and production of which of the following types of minerals is not very satisfactory?
(a) Ferrous Minerals (b) Non-Ferrous Minerals
(c) Energy Minerals (d) None of the above

28. Which of the following regions of India contain most of the reserves of coal, metallic minerals, mica and many other non-metallic minerals?
(a) The Himalayas
(b) Alluvial plains of North India
(c) Rock system of peninsula in Rajasthan
(d) Peninsular plateau region

29. Which of the following regions of India is almost devoid of economic minerals?
(a) The Himalayan belt
(b) The alluvial plains of North India
(c) The Thar desert
(d) The Peninsular plateau

30. Which of the following sedimentary mineral is formed as a result of evaporation, especially in arid regions?
(a) Coal (b) Potash salt
(c) Iron ore (d) Sulphur

31. Koderma in Jharkhand is the leading producer of which one of the following minerals?
(a) Bauxite (b) Mica
(c) Iron ore (d) Copper

32. Which of the following minerals is indispensable for electric and electronic industries?
(a) Iron (b) Nickel
(c) Manganese (d) Mica

ANSWER KEY

Competency Based Answers

Stand Alone Multiple Choice Answers

1. (a)	2. (d)	3. (b)	4. (c)
5. (c)	6. (a)	7. (c)	8. (c)
9. (b)	10. (c)	11. (d)	12. (c)
13. (c)	14. (a)	15. (b)	16. (c)
17. (a)	18. (b)	19. (a)	

Assertion-Reason Answers

1. **(a) Both assertion and reason are true and reason is the correct explanation of assertion.**
Use of iron brought about revolution in agriculture as different type of tools like axe, hook, plough etc. were invented. It also brought revolution in industry as different tools and machines were also invented and it brought revolution in transportation also as bullock-carts, ships, boats etc. were no more used as a means of transport.

2. **(b) Both assertion and reason are true but reason is not the correct explanation of assertion.**
Iron-ore is the basic mineral and the backbone of industrial development. India is rich in good quality iron-ores. Iron-ore is exported largely from India, however the reason does not justify the assertion.

3. **(a) Both assertion and reason are true and reason is the correct explanation of assertion.**
Minerals are found in varied forms in nature. Even the food that we eat contains minerals. Almost everything we use, from a tiny pin to a towering building or a big ship, all are made using minerals.

4. **(a) Both assertion and reason are true and reason is the correct explanation of assertion.**

5. **(d) Both assertion and reason are false.**
Increased use of fossil fuels causes serious environmental problems. Hence, there is a pressing need to use renewable energy sources like solar energy, wind, tide, biomass and energy from waste material.

6. **(c) Assertion is true but reason is false.**
Mining makes miners vulnerable to pulmonary diseases, the risk of collapsing mine roofs and fires in coal mines is a high risk to the life of miners. Moreover, the water also gets contaminated. However, it does not help in agriculture.

7. **(b) Both assertion and reason are true but reason is not the correct explanation of assertion.**
Due to its excellent electric strength, low power loss factor, insulating properties and resistance to high voltage, mica is an important mineral used in electronic industries. Reason, but, does not justify the assertion.

8. **(b) Both assertion and reason are true but reason is not the correct explanation of assertion.**
Mineral formation is slow as it requires millions of years to be created but are used very quickly in comparison.

9. **(a) Both assertion and reason are true and reason is the correct explanation of assertion.**
Natural gas is considered an environment friendly fuel because of low carbon dioxide emissions.

10. **(a) Both assertion and reason are true and reason is the correct explanation of assertion.**
Energy saved is energy produced, the economic development plans implemented since Independence necessarily required increasing amounts of energy to remain operational. Thus, its conservation is essential.

Match the Columns

1. (a)—(ii); (b)—(vii); (c)—(vi); (d)—(iii); (e)—(iv); (f)—(v); (g)—(i)
2. (a)—(ii); (b)—(iv); (c)—(v); (d)—(vi); (e)—(iii); (f)—(i); (g)—(vii)
3. (a)—(ii); (b)—(v); (c)—(i); (d)—(iii); (e)—(vi); (f)—(iv)

Case/Source Based Answers

I.	1. (d)	2. (c)	3. (d)	4. (d)
II.	5. (a)	6. (c)	7. (b)	8. (a)
III.	9. (c)	10. (a)	11. (d)	12. (a)
IV.	13. (c)	14. (d)	15. (d)	16. (d)
V.	17. (b)	18. (a)	19. (c)	20. (d)
VI.	21. (a)	22. (a)	23. (d)	24. (a)
	25. (b)	26. (d)		
VII.	27. (b)	28. (d)	29. (b)	30. (b)
	31. (b)	32. (d)		

DO IT YOURSELF...

Short Answer Type Questions

Q.1. What is an ore? 1

Q.2. Define minerals. 1

Q.3. Where is the largest solar plant located in India? 1

Q.4. Name the mineral ore from which aluminium is mainly obtained. 1

Q.5. Name the low grade brown coal. 1

Q.6. Which is the main source of energy in India? 1

Q.7. Which State of India is the largest producer of bauxite? 1

Q.8. Name the most abundantly available fossil fuel in India. 1

Q.9. Name the industry which uses limestone as its main raw material. 1

Q.10. Define the term 'mineral ore'. 2

Q.11. Name the ***two*** main ferrous minerals. 2

Q.12. Mention the ***two*** types of good quality iron ore found in India. 2

Q.13. Give ***two*** difference between lignite and anthracite coal. 2

Q.14. Give the difference between mineral and ore. 2

Q.15. 'Minerals are an indispensable part of our lives.' Support this statement with suitable examples. 3

Long Answer Type Questions

Q.16. Which is the most abundantly available fossil fuel in India? What are its ***three*** major forms? Write main features of each form. 5

Q.17. Which is the next major source of energy after coal in India? Describe any ***three*** advantages of it. 5

Q.18. Explain ***five*** points of distinction between conventional and non-conventional sources of energy. 5

Q.19. What are 'placer deposits'? 5