

GEOGRAPHY

Chapter 5: Minerals and Power Resources



MINERALS AND POWER RESOURCES

Minerals and their Types

Any naturally occurring substance which has a definite chemical composition is a mineral. Minerals are formed as a result of several natural processes without any human interference. Metals can be classified into metallic or non-metallic minerals. Differences between metallic and non-metallic minerals:

Metallic Minerals	Non-metallic Minerals
Metallic minerals contain metal in the raw form.	Non-metallic minerals do not contain metals.
These metals are generally associated with igneous rocks.	These metals are generally associated with sedimentary rocks.
They are usually hard and have a shine of their own.	They are not usually hard and have no shine of their own.
Examples: Iron, copper, bauxite, tin	Examples: Salt, coal, mica, clay

Processes Involved in the Extraction of Minerals

Mining is a process in which minerals buried in the rocks or under the surface of the Earth are taken out. Various ways in which minerals are mined are

Open Cast Mining: The surface of the Earth is removed to extract minerals which are lying at shallow depths.

Shaft Mining: Deep bores or tunnels known as shafts are made vertically from the top to the bottom to extract minerals lying at greater depths.

Drilling: Deep wells are bored to extract the minerals out of the Earth's surface.

Quarrying: Digging the Earth to extract minerals which lie close to the surface of the Earth.



Offshore drilling of oil

Distribution of Minerals in the World

Rocks bear many minerals. Minerals are found in igneous, metamorphic and sedimentary rocks. Metallic

minerals are mostly found in the igneous and metamorphic rocks which are part of large plateaus.

Sedimentary rocks mainly contain non-metallic minerals such as coal and limestone.

Some minerals found in the seven continents are

Asia

- China has vast deposits of lead, antimony, tin, iron ore and tungsten.
- Asia produces more than half of the world's tin. Apart from China, Malaysia and Indonesia are leading producers of tin in the world.
- India has rich deposits of iron ore.
- Manganese, bauxite, nickel, zinc and copper are some other minerals which are found in Asia.

Europe

- Europe is the leading producer of iron ore in the world.
- Large deposits of iron ore are found in Russia, Ukraine, Sweden and France
- In Eastern Europe and European Russia, vast mineral deposits of lead, zinc, copper, nickel and manganese are found.

North America

- Three regions in North America—the Appalachian region, the Canadian region north of the Great Lakes and the mountain ranges of the West—contain huge quantities of mineral deposits.
- While the Western Cordilleras have rich deposits of copper, zinc, gold and silver; iron ore, nickel, copper and gold are mainly found in the Canadian Shield region. Coal is mainly found in the Appalachian region.

South America

- South America has large deposits of gold, silver, manganese, bauxite, zinc, chromium, mica, platinum and diamond.
- Brazil is the largest producer of high-quality iron ore.
- While Chile and Peru are leading producers of copper, Brazil and Bolivia are among the largest producers of tin in the world.

Africa

- The continent of Africa is extremely rich in mineral resources. It is the leading producer of gold, silver, diamonds and platinum in the world.
- Zimbabwe and Zaire are two of the largest producers of gold in the world.

- Copper, chromium, uranium, cobalt, bauxite and iron ore are some other minerals which are found in Africa.
- Oil is mainly found in Nigeria, Angola and Libya.

Australia

- Australia is the largest producer of bauxite and among the leading producers of gold, diamond, tin and nickel.
- Large deposits of gold are found in the Kalgoorlie and Coolgardie regions of Australia.
- Australia is also rich in copper, lead, zinc and manganese.

Antarctica

- It has been estimated that large quantities of minerals are deposited in Antarctica.
- The Transantarctic Mountains of East Antarctica is rich in deposits of coal.
- Gold, silver, iron ore and oil are also present in large quantities in Antarctica.

Distribution of Minerals in India

Minerals	States/Location
Iron	Jharkhand, Odisha, Chhattisgarh, Madhya Pradesh, Goa, Maharashtra and Karnataka
Bauxite	Jharkhand, Odisha, Chhattisgarh, Madhya Pradesh, Maharashtra, Gujarat and Tamil Nadu
Mica	Jharkhand, Bihar, Andhra Pradesh and Rajasthan
Copper	Rajasthan, Madhya Pradesh, Jharkhand, Karnataka and Andhra Pradesh
Manganese	Maharashtra, Madhya Pradesh, Chhattisgarh, Odisha, Karnataka and Andhra Pradesh
Limestone	Bihar, Jharkhand, Odisha, Madhya Pradesh, Chhattisgarh, Rajasthan, Gujarat and Tamil Nadu
Gold	Kolar mines in Karnataka
Salt	Arabian Sea, Bay of Bengal, rocks and lakes

India is the largest producer and exporter of mica in the world. The country is also one among the major producers and exporters of salt in the world.

Minerals – Uses and Conservation

- Minerals are used in various industries.
- Aluminum is used in the manufacturing of aeroplanes and automobiles. It is also used in the bottling industry and in the construction of buildings.
- Copper is used in the electrical industry. Apart from it, it is used in making everything from coins to pipes.
- Minerals such as gold, silver and diamond are used in making jewellery.
- Silicon which is obtained from quartz is used in the computer industry. Because minerals are

non-renewable resources, it is important to conserve them. Minerals can be conserved in the following ways:

- To reduce wastage of minerals while mining
- To recycle used minerals
- To save electricity as India is dependent heavily on coal for the generation of electricity

Power Resources

Conventional Sources of Energy

Conventional sources of energy are those which have been in use for a long time. They are also not a clean source of energy as they considerably pollute the environment. Conventional sources of energy are firewood and fossil fuels. Firewood has been used for cooking and heating since ancient times. The remains of plants and animals which were buried under the Earth for millions of years got converted into fossil fuels by heat and pressure. Examples: Coal, petroleum, natural gas

Coal

- Coal is mainly used in the generation of electricity. Electricity produced from coal is known as thermal power.
- Coal is also known as Buried Sunshine because it was formed millions of years ago when plants and animals got buried under the Earth.
- China, USA, Germany, Russia, South Africa and France are leading producers of coal in the world. In India, coal is found in Raniganj, Jharia, Dhanbad and Bokaro in Jharkhand.

Petroleum

- Petroleum is generally found between the layers of rocks and in oil fields which are found offshore (sea located at some distance from the shore) and in coastal areas.
- After drilling, petroleum is sent to refineries where a variety of products such as petrol, diesel,
- kerosene, wax, plastics and lubricants are produced.
- Petroleum and its products are known as Black Gold as they are extremely valuable sources of
- energy.
- Iran, Iraq, Saudi Arabia and Qatar are leading producers of petroleum in the world. Other producers of petroleum are USA, Russia, Venezuela and Algeria
- In India, it is found in Digboi in Assam, Bombay High in Mumbai and in the deltas of Krishna and Godavari.

Natural Gas

- Natural gas is released when crude oil is brought to the surface of the Earth.

- Russia, Norway, UK and the Netherlands are major producers of natural gas in the world.
- In India, it is found in Jaisalmer, the Krishna and Godavari deltas, Tripura and in some offshore areas in Mumbai.
- Fossil fuels are being used at a rapid pace, and hence, their stocks are getting depleted. It is important to conserve these resources.

Hydel Power

- Electricity generated from falling water is known as hydel power. Rainwater or river water is stored in dams. Turbine blades are placed at the bottom of the dams.
- When falling water flows through the pipes placed at the bottom of the dam, the moving blades turn the generators to produce electricity. This is known as hydroelectricity.
- After the generation of electricity, the discharged water can be used for irrigation.
- Paraguay, Norway, Brazil and China are leading producers of hydel energy. In India, Bhakra Nangal dam, Gandhi Sagar, Nagarjuna Sagar and Damodar River Valley projects are used for the generation of hydroelectricity.



Electricity generated from falling water is known as hydel power.

Non-Conventional Sources of Energy

Sources of energy which are comparatively new and are generally obtained from renewable sources such as Sun and wind are known as non-conventional sources of energy.

Solar Energy

- Many solar cells are joined onto a solar panel which capture and store the Sun's energy.
- Solar energy can be used for heating and lighting purposes.
- Solar energy is largely used in solar heaters and solar cookers.
- It is also used for community lighting and traffic signalling.

Wind Energy

- Windmills have blades which rotate when the speed of the wind is high. They are connected to a generator to produce electricity.
- Wind farms have a cluster of windmills which are located in regions where winds blow at a great speed like in coastal regions and mountainous passes.
- Wind farms are found in Germany, the Netherlands, Denmark, UK, USA and Spain.



Wind farms have a cluster of windmills.

Nuclear Energy

- Nuclear energy is obtained from energy stored in the nuclei of atoms. They release energy during the process of nuclear fission. Wind farms have a cluster of windmills.
- USA and Europe are the major producers of nuclear energy. In India, nuclear power stations are located at Kalpakkam in Tamil Nadu, Tarapur in Maharashtra, Ranapratap Sagar in Rajasthan, Narora in Uttar Pradesh and Kaiga in Karnataka

Geothermal Energy

- Heat obtained from the Earth is known as geothermal energy. As the interiors of the Earth are hot, the heat energy may at times surface itself in the form of hot springs. This energy can be used for the generation of electricity.
- USA, New Zealand, Iceland and the Philippines extensively use geothermal energy for the production of electricity.
- In India, geothermal power plants are located in Manikaran in Himachal Pradesh and Puga Valley in Ladakh.



Heat obtained from the surface of the Earth is known as geothermal energy.

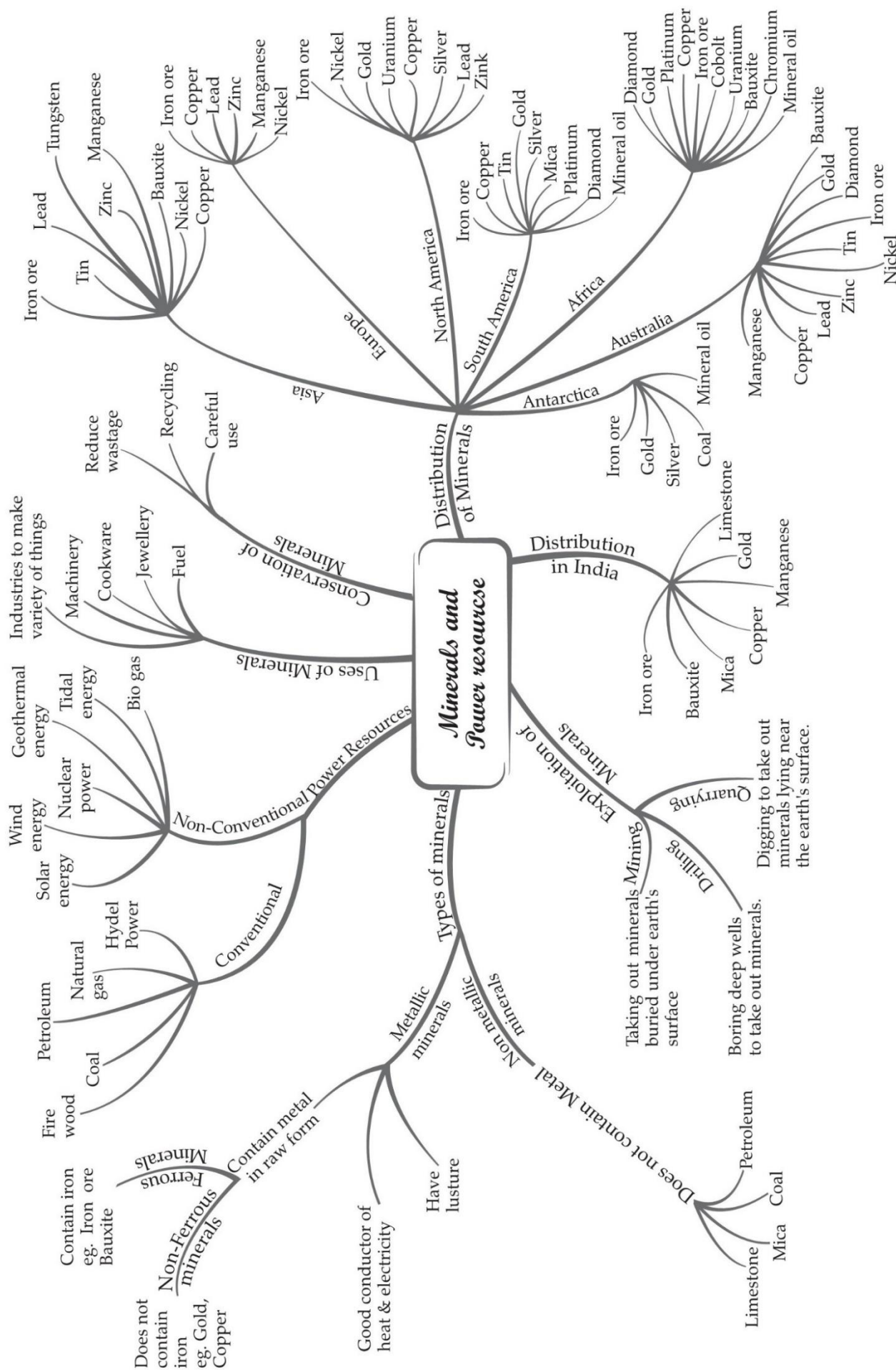
Tidal Energy

- Energy generated from tides is called tidal energy. During high tides, the forces of the tides are used to turn the turbines placed in the dam to produce electricity.
- Russia and France have many tidal mill farms.
- In India, tidal mill farms are located in the Gulf of Kachchh.

Biogas

- Biogas can be prepared from organic wastes such as dead plant and animal materials, cow dung and kitchen wastes. These wastes are converted into a gaseous fuel called biogas.
- It is not only an important fuel for cooking and lighting but also produces a great amount of organic manure every year

MIND MAP : LEARNING MADE SIMPLE



Important Questions

Multiple Choice Questions-

Question 1. A naturally occurring substance that has a definite chemical composition is a

- (a) Ore
- (b) Rock
- (c) Mineral
- (d) Copper

Question 2. Rock from which mineral are mined are known as

- (a) Metallic mineral
- (b) Limestone
- (c) Mineral
- (d) Ore

Question 3. Deep wells bored to take the petroleum and natural gas out is called

- (a) Quarrying
- (b) Drilling
- (c) Mining
- (d) Shaft mining

Question 4. Which among the following is the leading producer of iron-ore in the world?

- (a) Europe
- (b) Asia
- (c) Antarctica
- (d) North America

Question 5. Which is the rarest diamond on this earth?

- (a) Black diamond
- (b) Blue diamond
- (c) Red diamond
- (d) Green diamond

Question 6. What are the ways to conserve minerals is?

- (a) Recycling of minerals
- (b) Reducing waste in the process of mining
- (c) Both a and b
- (d) None of these

Question 7. What is the appropriate source of energy for coastal area?

- (a) Tidal energy
- (b) Solar energy
- (c) Biogas
- (d) Wind energy

Question 8. What is the name of the mineral that is extracted from Bauxite?

- (a) Silver
- (b) Manganese
- (c) Aluminum
- (d) Copper

Question 9. Which one of the following is a leading producer of copper in the world?

- (a) Bolivia
- (b) Ghana
- (c) Chile
- (d) Zimbabwe

Question 10. Which one of the following is not a characteristic of minerals?

- (a) They are created by natural processes.
- (b) They have a definite chemical composition.
- (c) They are inexhaustible.
- (d) Their distribution is uneven.

Question 11. What are the major types of power resources?

- (a) Conventional resources
- (b) Non-conventional resources
- (c) Both a and b
- (d) None of these

Question 12. What is 'Black gold'?

- (a) Coal
- (b) Mica
- (c) Petrol
- (d) None of these

Question 13. What are the fossil fuels?

- (a) Fuels used for domestic purpose

- (b) Fuel found in highly area
- (c) Created by buried organism
- (d) None of these

Question 14. What do you mean by conventional power resources?

- (a) Resource in use for a long period of time
- (b) Extensively used by the common people
- (c) Both a and b
- (d) None of these

Question 15. What are minerals?

- (a) Found freely in the nature
- (b) Have own chemical composition
- (c) Both a and b
- (d) None of these

Very Short:

1. Differentiate between a rock and an ore.
2. Define quarrying.
3. Name the leading tin producers in Asia.
4. Name two areas in Australia, which have large deposits of gold.
5. Name two minerals in whose production India contributes a significant part.
6. In which industry is silicon important? From which ore is it obtained?
7. Why are minerals considered non-renewable?
8. Why is coal called “buried sunshine”?
9. Why are petroleum and its derivatives called “black gold”?
10. What is natural gas?
11. Which was the first country to develop hydroelectricity?

Short Questions:

1. Name and describe briefly methods of extraction.
2. Where are minerals found?
3. Describe the mineral distribution in North America.
4. Write common uses of minerals.
5. How is hydroelectricity, produced?
6. What are the uses of minerals?

7. How is the distribution of iron placed in India?

Long Questions:

1. Name and describe some non- conventional sources of energy.
2. Write the advantages and disadvantages of non-conventional sources of energy.
3. Define mineral in brief and explain how they are formed without any human interference.
4. What is meant by nuclear power? Explain the process how it is obtained. Also name the places of India where the nuclear power stations are located.

Map Question:

1. Identify Canadian Shield, Appalachians, Western Cordilleras and Lake Superior with the help of an Atlas.

Answer Key:

MCQ:

1. (c) Mineral
2. (d) ore
3. (b) Drilling
4. (a) Europe
5. (d) Green diamond
6. (c) Both a and b
7. (a) Tidal energy
8. (c) Aluminum
9. (c) Chile
- 10.(c) They are inexhaustible.
- 11.(c) Both a and b
- 12.(a) Coal
- 13.(c) Created by buried organism
- 14.(c) Both a and b
- 15.(c) Both a and b

Very Short Answer:

1. A rock is an aggregate of one or more minerals. An ore is a rock from which minerals are mined.
2. Quarrying is a process of extraction in which minerals lying near the surface are simply dug out.

3. China, Malaysia and Indonesia are leading tin producers in Asia.
4. Two areas in Western Australia having large deposits of gold are Kalgoorlie and Coolgardie.
5. India has vast deposits of high-grade iron ore, and it is also a leading producer of salt.
6. Silicon is important in the computer industry. It is obtained from quartz.
7. Minerals take thousands of years to form. The rate of formation is much smaller than rate of consumption. So, we classify them as non-renewable.
8. Coal is called “buried sunshine” because it is found buried under the earth and is as important a source of energy as sunshine.
9. Petroleum and its derivatives are black in colour but as valuable as gold, so we refer to it as “black gold”.
10. Natural gas is a fossil fuel obtained with petroleum deposits in oil fields.
11. Norway was the first country to develop hydroelectricity.

Short Answer:

Ans: 1. Mining, drilling and quarrying are methods of extraction. Mining is a process of extraction of taking out minerals from rocks under the earth’s surface. Open cast mining: In this, minerals lying at shallow depths are taken out by removing the surface layer. Shaft mining: In this, deep bores (called shafts) are made to reach mineral deposits lying at large depths. Drilling: In this, deep wells are bored to take out minerals. Quarrying: It is the process of extraction in which minerals lying very close to the surface are extracted just by digging them out.

Ans: 2. Minerals are found in different types of rocks. Metallic minerals are usually found in igneous and metamorphic rocks that form large plateaus. Examples: iron ore is found in north Sweden, copper and nickel in Canada. In igneous and metamorphic rocks in South Africa, iron, nickel, chromite’s and platinum are found. Non-metallic minerals are found in sedimentary rock formations. Limestone deposits are found in France. Mineral fuels such as coal and petroleum are found in sedimentary strata

Ans: 3. The mineral deposits in North America are found in three zones: the Canadian region in the north of the Great Lakes, the Appalachian region and the Rocky Mountains in the West. Iron ore, nickel, gold, uranium and copper are mined in the Canadian Shield Region, coal in the Appalachian region. Western Cordilleras have vast deposits of copper, lead, zinc, gold and silver.

Ans: 4. Minerals are important in many industries. Minerals used in gems are usually very hard. These are then set in varying styles of jewellery. Iron and copper are metals used in almost everything. Copper is present in everything from coins to pipes and electricity wires. Silicon, obtained from the mineral quartz, is the base of computer industry. Aluminum, obtained from bauxite ore, and its alloys are used in aeroplanes due to their light weight. Aluminum is also used in kitchen cookware.

Ans: 5. Hydroelectricity is produced from the energy possessed by water falling from great

heights. River water is stored in dams. When rain water or river water falls from heights, it flows over turbine blades placed at the bottom of the dam. The moving blades are connected to a generator which produces electricity from this energy. This electricity is called hydroelectricity. The water discharged after its production is used for irrigation.

Ans: 6. Minerals are used in many industries. Minerals which are used for gems are usually hard. These are then set in various styles of jewellery. Copper is another metal used in everything from coins to pipes, silicon used in computer industry is obtained from quartz. Aluminum obtained from its ore bauxite is used in automobiles and aeroplanes, bottling industry, buildings and even in kitchen cookware.

Ans: 7. India has deposits of high-grade iron ore. The mineral is found mainly in Jharkhand, Odisha, Chhattisgarh, Madhya Pradesh, Goa, Maharashtra and Karnataka.

Long Answer:

Ans: 1. Non-conventional power sources are those power sources that have come into use recently due to the depleting conventional resources and growing awareness. Solar energy, wind energy, geothermal energy, nuclear power and tidal energy are examples of non-conventional power sources.

Solar energy is the heat and light energy captured from the sun. Solar cells help to convert this energy to electricity. Solar energy is used in solar heaters, solar cookers, solar dryers, etc.

Wind energy is the energy possessed by moving air (wind). Windmills are used to convert wind energy to electricity. Wind farms having clusters of windmills located in coastal regions and mountain passes.

Nuclear power is energy possessed by the nuclei of atoms of naturally occurring radioactive elements like uranium-, thorium, etc.

Geothermal energy is the heat energy obtained from the inside of the earth. The temperature inside the earth increases as we go deeper. This heat is used to produce electricity. It is accessed in the form of hot springs. Tidal energy is the energy generated from tides. It is harnessed by building dams at narrow openings of the sea. Biogas is a gaseous fuel obtained from the decomposition of organic waste like dead plant and animal material or animal dung and kitchen waste. It is an excellent fuel for cooking and lighting and is environment-friendly.

Ans: 2. • non-conventional sources of energy are usually inexhaustible. They do not pollute the environment.

- Nuclear power is emitted in large amounts.
- Most non-conventional sources of energy cost less.
- These forms of energy are safe to use and clean.

Disadvantages:

- Windmills are costly to set up. So, using them to harness wind energy is costly, even though the electricity generated from it is cheap.

- Setting up windmills disturbs radio and TV broadcast.
- Harnessing tidal energy destroys natural habitats of wildlife.
- Moreover, tidal energy is difficult to harness.
- Obtaining nuclear energy from radioactive material generates radioactive waste. It is expensive too.
- Biogas, although useful and renewable, contributes to greenhouse effect.

Ans: 3. A naturally occurring substance that has a definite chemical composition is a mineral. Minerals are not evenly distributed over space. They are concentrated in a particular area or rock formations. Some minerals are found in areas which are not easily accessible such as the Arctic Ocean bed and Antarctica.

Minerals are formed in different types of geological environments, under varying conditions. They are created by natural processes without any human interference. They can be identified on the basis of their physical properties such as colour, density, hardness and chemical property such as solubility.

Ans: 4. Nuclear power is obtained from energy stored in the nuclei of atoms of naturally occurring radioactive elements like uranium and thorium. These fuels undergo nuclear fission in nuclear reactors and emit power. The greatest producers of nuclear power are U.S.A and Europe. In India Rajasthan and Jharkhand have large deposits of Uranium.

Thorium is found in large quantities in the Monazite sands of Kerala. The nuclear power stations in India are located in Kalapakkam in Tamil Nadu, Tarapur in Maharashtra, Ranapratap Sagar near Kota in Rajasthan, Narora in U.P, and Kaiga in Karnataka.

Map Answer:

1.

