CHAPTER MINERALS AND ENERGY RESOURCES

Syllabus

> Minerals and Energy Resources: Types of minerals, distribution (Note: on map only) use and economic importance of minerals, conservation, types of power resources: conventional and non-conventional, distribution and utilization, and conservation.



TOPIC-1 Minerals and their Mode of Occurrence

Quick Review

Mineral are "homogenous, naturally occurring substance with a definable internal structure."

> Importance of Minerals :

- Everything we use, eat and drink has minerals.
- Economic development of people or nations can be vastly accelerated by the presence of valuable minerals.
- Make our life comfortable and convenient.
- They are also responsible for all the biological processes on earth.
- Different appearances and occur in various forms, in a wide range of colours, hardness, forms lustre and density. As all minerals are formed from a certain combination of elements which depends upon the chemical and physical conditions under which the mineral forms. The geologists use these properties to categorise minerals.

Rocks Containing Minerals:

- Compacted substances that comprise the earth's crust are called rocks.
- Rocks are the naturally formed aggregate of mineral particles. It is the minerals that impart their texture, colour, shape, hardness or softness to rocks. For example limestone is a rock consists of a single mineral.
- Majority of rocks on the earth's crust are a combination or an aggregate of different minerals.
- Over 3000 minerals have been identified so far; only a few are abundantly found.

> Mode of occurrence of minerals:

- In igneous and metamorphic rocks : The smaller occurrences are called veins and the larger occurrences are called lodes. Examples: tin, copper, zinc, lead, etc.
- In sedimentary rocks: In these rocks, minerals occur in beds or layers. Coal, iron ore, gypsum, potash salt and sodium salt are the minerals found in sedimentary rocks.
- **By decomposition of surface rocks:** Decomposition of surface rocks and removal of soluble constituents leaves a residual mass of weathered material which contains ores. Bauxite is formed in this way.
- As alluvial deposits: These minerals are found in sands of valley floors and the base of hills. These deposits are called placer deposits. Examples; gold, silver, tin, platinum, etc.
- In ocean water: Most of the minerals in ocean water are too widely diffused to be of economic importance. But common salt, magnesium and bromine are mainly derived from ocean waters.

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Know the Terms

- Mineral: A naturally occurring substance that has a definite chemical composition is a mineral.
- > Rock: A rock is an aggregate of one or more minerals but without definite composition of constituent of mineral.
- Ores: Rocks from which minerals are mined are known as ores. Although more than 2,800 types of minerals have been identified, only about 100 are considered ore minerals.
- Mining: Mining is the extraction of valuable minerals or other geological materials from the earth, usually from an orebody, lode, vein, seam, reef or placer deposit.
- Open Cast Mining: Open-pit, open-cast or open cut mining is a surface mining technique of extracting rock or minerals from the earth by their removal from an open pit or borrow.
- Shaft mining: Shaft mining is a form of underground mining using shafts driven vertically from the top down into the earth to access ore or minerals.
- > Drilling: Drilling is a cutting process that uses a drill bit to cut a hole of circular cross-section in solid materials.
- Quarrying: Quarrying is the process of removing rock, sand, gravel or other minerals from the ground in order to use them to produce materials for construction or other uses.

Know the Links

- exploringgeography.wikispaces.com/file/view/Chapter-7.pdf
- www.slideshare.net/AJINGHOSH/mineral-resources-30451967

Yery Short Answer Type Questions

(1 mark each)

(3 marks each)

\boxed{U} Q. 1. What is a mineral?

(NCERT)

- Ans. Mineral is a homogeneous naturally occurring substance with a definable internal structure. 1
- A Q. 2. Which rock consists of single mineral only? [Board Term-II, Delhi Set-I, 2015]
- Ans. Limestone.
- A Q. 3. Why are there a wide range of colours, hardness, crystal forms, lustre and density found in minerals? [Board Term-II, Delhi Set–I, 2016]
- Ans. The ranges found in minerals are due to physical and chemical conditions. 1
- U Q. 4. How do minerals occur in igneous and metamorphic rocks?

[Board Term-II, 2016 Delhi Set-II]

- Ans. In igneous and metamorphic rocks, minerals may occur in cracks, crevices, faults and joints. 1
- A Q. 5. How do minerals occur in sedimentary rocks? [Board Term-II, Delhi Set–III 2016, 2015, Outside Delhi Set-I]

Ans. In sedimentary rocks, minerals occur in beds or layers. They have been formed as a result of deposition, accumulation and concentration in horizontal strata.

- A Q. 6. Name the minerals formed in beds and layers. [Board Term-II, Set-TCJQ6VD, 2016]
- Ans. Minerals such as coal, gypsum, potash salt and sodium salts are formed in such modes. 1
- Q. 7. How does mining affect the health of miners? [Board Term-II, Foreign Set-III, 2016]
- Ans. The dust and the noxious fumes inhaled by the miners make them vulnerable to pulmonary diseases. 1
- Q. 8.What types of minerals are mainly obtained from veins and lodes?

[Board Term-II, outside Delhi Set-I, II, III, 2017]

Ans. Major metallic minerals like tin, copper, zinc and lead, etc., are obtained from veins and lodes. 1

Short Answer Type Questions

A Q. 1. What are 'placer deposits'? Give examples of minerals found in such deposits.

[Board Term-II, Set-01/B1 2010]

- **Ans.** (i) Certain minerals may occur as alluvial deposits in sands of valley floors and base of hills. These deposits are called 'placer deposits'.
- (ii) They generally contain minerals which are not corroded by water.
- (iii) Gold, silver, tin and platinum are examples of some important minerals found in 'placer deposits'. $1 \times 3 = 3$

U Q. 2. How is mining activity hazardous? Explain. [Board Term–II, (Set-TCJQ6VD) 2016]

ΟK

U How is the mining activity injurious to the health of the miners and environment? Explain. [Board Term-II, Delhi Set-I, II, III, 2015]

OR

"Mining affects health and environment both."
 Comment. [Board Term-II, (Set-68006) 2012]

- Ans. The mining activity is injurious to the health of the miners and environment as :
 - (i) The dust and noxious fumes inhaled by miners make them vulnerable to pulmonary diseases.
 - (ii) The risk of collapsing mine roofs.
 - (iii) Inundation and fires in coal mines are a constant threat to miners.
 - (iv) The water sources in the region get contaminated due to mining.
 - (v) Dumping of waste and slurry leads to degradation of land, soil and increase in stream and river pollution. 1 × 3 = 3
 ICREE Marking Scheme 20151

[CBSE Marking Scheme, 2015]

Q. 3. Name the non-metallic mineral which can split easily into thin sheets. Mention its uses.

[Board Term-II, 2014]

Ans. Mica is the non-metallic mineral which can be split easily into thin sheets.

Mica is used in:

- (i) Electric and electronic industries: Mica is used in these industries due to its excellent dielectric strength, low power loss factor, insulating properties and resistance to high voltage.
- (ii) Plastic industry uses mica as an extender and filler. 1 + 2 = 3
- U Q. 4. Explain three factors that make mineral extractions commercially viable.

[Board Term-II, Set-14/A1, 2011]

- **Ans. (i)** The minerals content of the ore must be in sufficient concentration.
 - (ii) The type of formation or structure in which they are found determines the relative cases with which mineral ores may be mined.
- (iii) The mineral should be close to the market so that the transportation cost is low. $1 \times 3 = 3$

Ferrous and Non-ferrous Minerals and their Conservation

Quick Review

- > Types of Minerals: Metallic and non-metallic.
- > Metallic Minerals: further sub-divided into ferrous and non-ferrous.
 - Ferrous (containing iron) are iron ore, manganese ore, chromite, pyrite, nickel and cobalt.
 - Non-ferrous (containing metals other than iron) gold, silver, copper, lead, bauxite, tin and magnesium.
- > Non-metallic Minerals: They are limestone, nitrate, potash, mica, gypsum, coal, petroleum
- > Iron Ore: Basic mineral, backbone of industrial development. There are four varieties of iron ore:
 - Magnetite: contains 70% iron, finest quality, with magnetic properties.
 - Haematite: contains 60% to 70% iron, most important industrial iron ore.
 - Limonite: contains 40% to 60% iron.
 - **Siderite:** contains 40% to 50% iron.
- Major Iron Ore Belts in India: Orissa Jharkhand Belt; Durg Bastar Chandrapur Belt; Bellary Chitradurga Chikmaglur Tumkur Belt; Maharashtra Goa Belt.
- Well-known iron ore mines: Durg and Bastar districts of Chhattisgarh, Paschimi and Purbi Singhbhum districts of Jharkhand, Sundargarh, Keonjhar and Mayurbhanj districts of Orissa, North Goa, Chikmagalur and Bellary districts of Karnataka, Ratnagiri of Maharashtra.
- > Manganese Ore:
 - Mainly used for making iron and steel and preparing alloys.
 - Also used to manufacture bleaching powder, insecticides, paints and batteries.
 - The main reserves of manganese ore are found in Karnataka, Orissa, Madhya Pradesh, Andhra Pradesh, Jharkhand, Maharashtra and Goa.
- Copper: It is used for making utensils, electric wires and alloys. Copper reserves are concentrated in Madhya Pradesh, Rajasthan, Jharkhand, Gujarat, Karnataka and Andhra Pradesh.
- Bauxite: It is an ore from which aluminium is obtained. Reserves are found in Jharkhand, Orissa, Gujarat, Maharashtra, Chhattisgarh, Madhya Pradesh and Tamil Nadu.
- Mica: It is used in electrical and electronic industries. Jharkhand, Bihar, Andhra Pradesh and Rajasthan are major producers.
- Limestone is composed of calcium carbonate or calcium and magnesium carbonates. It is used in the cement industry, smelting of iron and in chemical industries. Reserves are found in Madhya Pradesh, Chhattisgarh, Andhra Pradesh, Rajasthan, Gujarat, Karnataka and Himachal Pradesh.

- All types of minerals are exhaustible resources. Other serious problems associated with minerals are production and accumulation of wastes at various stages of mining, processing as well as use.
 - Efficiency in Mining: Present technologies are inadequate in terms of their efficiency. The world has yet to evolve a really efficient technology suited to present day environment called the technology of beneficiation. *e.g.*, A lot of feed stock went waste during petroleum refining; today these wastes are utilized to make many by-products.
 - **Substitutes:** Scarce minerals can be substituted by developing biodegradable alternatives. For example, Copper was earlier used extensively in electrical industries. But now besides aluminium, many other materials are used to conserve precious copper.
 - **Recycling:** Mini steel plants are using scrap iron all over the world, which are the best examples of recycling. It helps reduce wastes, but efficient recycling technologies have yet to be developed. Recycling is very expensive. Problems also arise on account of mixing together of various types of minerals, otherwise products made from iron, copper, lead, zinc and almost all types of minerals can be recycled for more.
 - Minimised Exports: Exports should be minimised and value added manufactured products should be exported.
- Most dynamic elements in mineral are conservation is however, technology as well as ecosystem management. Assessing the future demand for resources, proper planning is also a conservative technique. It also includes the use and disposal of wastes which constitutes the earth's greatest environment pollutants.

Know the Terms

- Metallic Minerals: Metallic minerals are minerals which contain one or more metallic elements. Metals are hard substances that conduct heat and electricity and have a characteristic lustre or shine. Iron ore, bauxite, manganese ore are some examples.
- Non-Metallic Minerals: The non-metallic minerals do not contain metals. Limestone, mica and gypsum are examples of such minerals. The mineral fuels like coal and petroleum are also non-metallic minerals.
- Ferrous minerals: These minerals contain iron content. Examples- Iron ore, manganese, etc.
- > Non-ferrous minerals: These minerals do not contain iron content. Examples-Copper, aluminium etc.

Know the Link

✤ www.preservearticles.com/.../various-types-of-minerals-found-in-india.ha

Yery Short Answer Type Questions

(1 mark each)

A Q.1. What is hematite?

[Board Term-II, Set-WVIVSA5, 2015]

- Ans. Hematite ore is the most important industrial iron ore in terms of the quantity used.
- U Q.2. How did the Bailadila iron-ore field get its name? [Board Term-II, Foreign Set–II, 2016]
- Ans. The Bailadila hills look like the hump of an ox, hence Bailadila iron-ore field get its name. 1
- Q. 3. How is iron-ore transported from Kudremukh mines to a port near Mangaluru?

[Board Term-II, Foreign Set-I, 2016]

Short Answer Type Questions

Q. 1. What are the uses of copper? Name the two leading copper producing states of India. [Board Term-II, Set-37/A1, 2011]

Ans. Uses of copper :

- (i) In manufacturing electrical cables.
- (ii) In electronic industries.
- (iii) In chemical industries.

Ans. Iron-ore is transported as slurry through pipelines. **1**

□ Q. 4. Why is copper mainly used in electrical cables and electronic industries?

[Board Term-II, SQP 2016]

- Ans. It is used in electrical cables as it is malleable, ductile and a good conductor of heat and electricity. 1
- U Q. 5. Why aluminium metal has great importance? [Board Term–II, Outside Delhi Set–III, 2016]
- Ans. It has great importance because it combines the strength of metals such as iron with extreme lightness and also with good conductivity and great malleability.

(3 marks each)

The two leading copper producing states of India are Madhya Pradesh and Rajasthan.

(Any two) 2+1=3 [CBSE Marking Scheme, 2011]

□ Q. 2. Name the mineral ore from which aluminium is extracted? Why is it gaining importance? Give its distribution in India.

[Board Term-II, Set-68045, 2012]

Ans. (i) Bauxite.

- (ii) Aluminium is gaining importance because of its extreme lightness, good conductivity and great malleability. It combines the strength of metals such as Iron.
- (iii) It is mainly found in Amarkantak Plateau, Maikal Hills and the plateau region of Bilaspur-Katni. Koraput district in Odisha has large deposits. Odisha is the largest bauxite producing state. Others are Gujarat, Maharashtra and Jharkhand.

(Any three) $1 \times 3 = 3$

[CBSE Marking Scheme, 2012]

Q. 3. Why is mica considered the most important mineral in electric and electronic industries? Give three reasons.

> [Board Term–II, Set (KCG34U9) 2016] OR

How is mica one of the most indispensable minerals? Explain any three points.

[Board Term-II, Set-23/B1, 2011]

Ans. Mica is :

- (i) Excellent dielectric in strength and has low powerless factor.
- (ii) It has insulating properties and resistance to high voltage.
- (iii) Most indispensable mineral used in electric and electronic industries. 1×3=3

[CBSE Marking Scheme, 2011]

Q. 4. Explain any three different forms in which minerals generally occur.

[Board Term-II, Set (68042) 2012]

- **Ans. (i)** Minerals occur in the form of veins and lodes (In igneous and metamorphic rocks).
 - (ii) In sedimentary rocks, a number of minerals occur in beds and layers.
- (iii) As residual mass of weathered material.
- (iv) As alluvial deposits in ocean waters.

(Any three) $1 \times 3 = 3$

[CBSE Marking Scheme, 2012]

Q. 5. Why is conservation of minerals important? How can we conserve minerals?

[Board Term-II, Set (2027), 2014, 2012]

Long Answer Type Questions

U Q. 1. Explain the importance of conservation of minerals. Highlight any three measures to conserve them.

[Board Term–II, Outside Delhi Set–1, 2016] OR

Why is conservation of mineral resources essential? Explain any three methods to conserve them. [Board Term-II,2015 Delhi Set-I 2014]

- Ans. Conservation of minerals is important for the following reasons :
 - (i) Minerals are exhaustible.
- (ii) They are limited. $1\frac{1}{2}+1\frac{1}{2}=3$
- Q. 6.Which state is the largest producer of manganese in India? Mention any two uses of manganese.

[Board Compartment Delhi SA-II, Set I, II, III (2017)]

- Ans. Odisha is the largest producer of manganese in India. Two uses of manganese are:
 - (i) Manganese compounds are used in dry-cell batteries, matches, fireworks, etc.
- (ii) Manganese is used as an alloying agent for aluminium. 3
- Q. 7. Describe any three characteristics of the Durg-Bastar-Chandrapur Iron-ore belt in India. Board Outside Delhi SA-II, Set I, II, III (2017)
- Ans. (i) Durg-Bastar-Chandrapur belt lies in Chhattisgarh and Maharashtra and comprises of high grade haematite iron ore.
 - (ii) Very high grade haematites are found in the famous Bailadila range of hills in the Bastar district of Chhattisgarh.
- (iii) Iron ore from these mines is exported to Japan and South Korea via Vishakhapatnam port. 3
- Q. 8. Describe any three characteristics of Odisha-Jharkhand belt of iron ore in India.

[Board Delhi SA-II, Set I, II, III (2017)]

- Ans. (i) In Odisha high grade hematite ore is found in Badampahar mines.
- (ii) This belt contains high grade haematite ore found in kendujhar and Mayurbhanj mines.
- (iii) In the adjoining Singbhum district of Jharkhand haematite iron ore is mined in Gua and Noamundi. $1 \times 3 = 3$
- Q. 9. Describe any three characteristics of Bellary-Chitradurga-Chikmaglur-Tumkur iron ore belt in India. [Board Foreign SA-II, Set I, II, III (2017)]
- Ans. (i) Bellary-Chitradurga-Chikmaglur-Tumkur belt in Karnataka has large reserves of iron ore.
- (ii) The Kudermukh mines located in the Western Ghats of Karnataka are a 100 per cent export unit.
- (iii) Kudremukh deposits are known to be one of the largest in the world.
- (iv) The ore is transported as slurry through a pipeline to a port near Mangalore. (Any three) 1×3=3

(5 marks each)

Why is it necessary to conservation mineral resources? Explain any four ways to conserve mineral resources.

[Board Outside Delhi SA-II, Set I (2017)]

Ans. Reasons for Conservation :

- (i) The strong dependence of industry and agriculture upon minerals.
- (ii) The process of mineral formation is slow.
- (iii) They are non-renewable. (Any two)

Methods to conserve :

- (i) Minerals should be used in a planned and sustainable manner.
- (ii) Improved technology needs to be constantly evolved to allow use of low grade ore at low cost
- (iii) Recycling of metals using scrap metals.
- (iv) Wastage in the mining and processing should be minimised.
- (v) Use of scrap metals.
- (vi) Use of alternate substitutes. (Any three) 2 + 3 = 5[CBSE Marking Scheme, 2015]

TOPIC-3 Conventional Sources of Energy

Quick Review

- Energy Resources: Energy is the ability to do work, it is also called Power. The modern unit of measurement of power is Watt. Energy is required for all activities. It is needed to cook, to provide light and heat, to propel vehicles and to drive machinery industries.
- Energy-The Source of Power: The chief sources of power are energy from fossil fuels, such as coal, petroleum, natural gas, nuclear materials, falling water, sun, wind, etc. Wind, sunrays and falling water are converted into electricity while others like coal, petroleum and natural gas- are applied directly in motor vehicles and machines. Fossil fuels require combustion; they produce many gases and wastes causing damage to the environment. 2/5th of the global energy consumption comes from burning oil and the rest from burning coal and natural gas.
- Electricity: Electricity is obtained in three ways which are termed as hydro-electricity, thermal electricity and nuclear electricity.
- Coal: Coal is the prime source of energy, often called the "Mother of Industries" or "Black Gold". It was the basis of industrial revolution. It is used as a raw material in the iron and steel and chemical industries. It is the main fuel for producing thermal power. India ranks 7th in the world in coal reserves.
- > Four types of coal:
 - Anthracite: Contains 80% carbon, hard, black and compact, found only in Jammu and Kashmir. It is the highest quality hard coal.
 - **Bituminous:** 60-80% carbon, widely used.
 - Lignite: 60% of carbon, low grade. It is called "brown coal".
 - **Peat :** <50% carbon and burns like wood.
- Petroleum: Liquid fossil fuel, wells are dug or drilled on land or offshore to bring oil to the surface. This crude oil is transported to refineries where it is changed into gasoline and petrochemicals. Petroleum refineries serve as 'nodal industries' for chemical, fertilizer and synthetic textile industries as various products are obtained during refining petroleum. It provides fuel for heating, lighting, running machineries, vehicles, lubricants and raw materials for some manufacturing plastics, chemicals, etc.
- Natural Gas: A clean energy resource associated with petroleum. It can be extracted easily by drilling wells. Does not require processing, does not emit CO2 and burns hotter and clearer, is cheaper and can be used to generate electricity, but it is limited. Used as a source of energy as well as an industrial raw material in the petrochemical industry.
- Electricity is generated mainly by different methods. Thermal Electricity is obtained by using coal, petroleum and natural gas. Hydroelectricity is produced from water released at a great force from a high head. Nuclear Electricity is produced from uranium and thorium.

Know the Terms

- Renewable sources of energy: These energy resources can be replenished. They may be renewed after use. Example-solar energy, wind energy, etc.
- Non-Renewable sources of energy: These sources of energy are exhaustible. The deposits cannot be renewed or replenished after use. Example-fossil fuels.

Know the Links

- > www.preservearticles.com/.../difference-between-conventional-and-non
- https://en.wikipedia.org/wiki/Mining_in_India

Yery Short Answer Type Questions

A Q. 1. Which is the oldest oil producing state of India?Ans.Assam.1

- \square Q. 2. How power resources are classified?
- Ans. Power resources may be broadly categorised as conventional and non-conventional resources. 1
- A Q. 3. What are conventional sources of energy?
- **Ans.** Conventional sources of energy generally nonrenewable sources of energy which have been in

Short Answer Type Questions

- Q. 1. Why is energy required for all activities? How can energy be generated? [Board Term-II, 2014]
- Ans. (i) Energy is a basic requirement for economic development.
- (ii) Every sector of the national economy needs input of energy.
- (iii) Consumption of energy in all forms has been steadily rising all over the country.
- (iv) Rising prices of oil and gas and their potential shortage have raised uncertainties about the security of energy supply in future. (Any two) Energy can be generated from fuel minerals like coal, petroleum, natural gas, uranium and from electricity. 2+1=3
- A Q. 2.Describe any three importance of coal as a source of energy. [Board Term-II, Set-2080, 2012]
 - Ans. Importance of coal as a source of energy in India are :
 - (i) Coal is the most abundantly available fossil fuel in India.
 - (ii) It provides a substantial part of the nation's energy needs.
 - (iii) It is used for power generation.
 - (iv) It supplies energy to industry as well as for domestic needs. (Any three) 1 × 3 = 3
 [CBSE Marking Scheme, 2012]
- Q. 3. What are the two main ways of generating electricity? How are they different from each other? Explain. [Board Term-II, 2014]

S.No.	Thermal Electricity	Hydro Electricity
(i)	It is obtained by using coal, petroleum and natural gas.	It is produced from water.
(ii)	It is a non-renewable resource.	It is a renewable.
(iii)	It causes pollution.	It does not cause pollution.
(iv)	It is expensive in the long run.	It is cheaper in the long run.
		(Any three) $1 \times 3 = 3$

common use for a long time. *Examples*, firewood, coal, natural gas, etc. **1**

A Q.4.Why is energy needed? Write one reason. [Board Compartment Delhi SA-II,

Set I, II, III (2017)]

Ans. We use different energy sources to generate the electricity we need for our homes, schools, businesses and factories. 1

(3 marks each)

- Image: Register of the second seco
 - **Ans.** (i) Non-renewable sources are going to exhaust such as coal, petrol, natural gas, etc. They can cause environmental pollution; therefore, we have to use renewable resources.
 - (ii) India has abundance of solar energy, wind, water, and biomass.

(iii) Rising prices of oil and gas and their shortage have raised uncertainties about energy resources in the future. $1 \times 3 = 3$

[CBSE Marking Scheme, 2012]

Q. 5. Which are the two main minerals used to obtain nuclear energy? Name any two states where these minerals are found.

[Board Term-II, Set-WVIVSA5, 2015]

- **Ans.** Nuclear or atomic energy is obtained by altering the structure of atoms. When such an alternation is made, much energy is released in the form of heat and this is used to generate electric power.
 - (i) Uranium and Thorium are used for generating atomic or nuclear power.
 - (ii) They are available in Jharkhand and Rajasthan. 3 [CBSE Marking Scheme, 2015]
- Q. 6. "Natural gas is an important source of energy." Support the statement. [Board Term-II, Outside Delhi, set I, II, III 2017]

Ans. Natural gas

In a power deficient country, natural gas is a precious gift.

- (i) It can be used as a source of energy. It takes less time to build a power plant based on natural gas.
- (ii) It can be used as an industrial raw material in petro-chemical industry.
- (iii) It can be used in building the fertilizer plants and thereby encouraging the use of fertilizers. It can boost agricultural production.
- (iv) Through easy transportation by way of pipelines, its utility is further increased
- (v) Use of Compressed Natural Gas (CNG) for vehicles to replace liquid fuels is gaining wide popularity in the country. (Any three) 1 × 3 = 3

(1 mark each)

2 Long Answer Type Questions

☑ Q. 1. Highlight the importance of petroleum. Explain the occurrence of petroleum in India. [Board Term–II, (Delhi Set–I) 2016]

Ans. Importance of Petroleum :

- (i) Petroleum is the major energy source in India.
- (ii) Provides fuel for heat and lighting.
- (iii) Provides lubricant for machinery.
- (iv) Provides raw material for a number of manufacturing industries.
- (v) Petroleum refineries act as nodal industry for synthetic, textile, fertilizer and chemical industries. (Any two) Its occurrence :
- (i) Most of the petroleum occurrences in India are associated with anticlines and fault traps.
- (ii) In regions of folding, anticline or domes, it occurs where oil is trapped in the crest of the up fold.

(5 marks each)

- (iii) Petroleum is also found in fault traps between porous and non-porous rocks. 2 + 3 = 5
 [CBSE Marking Scheme, 2016]
- A Q. 2. Which is the most abundantly available fossil fuel in India? Assess the importance of its different forms.

[Board Term-II, (Outside Delhi Set-I, II, III) 2015]

- Ans. Abundantly available fossil fuel in India is Coal. Importance:
 - (i) Peat has low carbon and high moisture content and low heating capacity.
 - (ii) Lignite is a low grade brown coal which is soft with high moisture content. It is used for generating electricity.
 - (iii) Bituminous is the most popular coal of commercial use. It has a special value for smelting iron in blast furnaces.
 - (iv) Anthracite is the highest quality hard coal.1 + 4 = 5 [CBSE Marking Scheme, 2015]

TOPIC - 4 Non-conventional Sources of Energy

Quick Review

- Non-Conventional Sources of Energy: The potential of non-conventional sources of energy is large. They use renewable resources for energy generation. Following are the six main non-conventional sources of energy: namely, solar energy, wind energy, biomass energy, geothermal energy, tidal energy and hydro power.
 - **Solar Energy:** Photovoltaic technology converts sunlight directly into electricity. Solar energy is used for cooking, pumping, heating of water, refrigerator and street lighting.
 - Wind Energy: India has a wind power potential of 20,000 MW. Tamil Nadu, Andhra Pradesh, Karnataka, Gujarat, Kerala, Maharashtra and Lakshadweep have important wind farms.
 - **Biogas:** Shrubs, farm wastes, animal and human wastes are used to produce biogas for domestic consumption in the rural areas.
 - Other Non Conventional Sources include geo-thermal energy, tidal energy and wave energy.

> Conservation of Energy Resources :

- Energy is basic requirement for economic development. Every sector of the economy needs inputs of energy for its development.
- Most of the energy resources are limited.
- Due to industrialization, modernisation and urbanisation, the consumption of energy in all forms has been steadily rising all over the country.

> How Can We Conserve Energy Resources?

- Need to develop a sustainable path of energy development, i.e., energy development but not at the cost of environment or needs of future generation.
- Judicious use of limited energy resources.
- Wastage of minerals should be minimised.
- Modern technology should be used for the exploitation of energy resources.
- Export of energy resources should be minimised.

- Use of substitutes in order to save energy resources.
- Encourage recycling of energy resources.

Know the Terms

- Solar energy: Solar power is the conversion of energy from sunlight into electricity, either directly using photovoltaics (PV), indirectly using concentrated solar power, or a combination.
- Wind energy: Wind power is the use of air flow through wind turbines to mechanically power generators for electric power.
- Biogas: Biogas typically refers to a mixture of different gases produced by the breakdown of organic matter in the absence of oxygen.
- > Geothermal energy: Geothermal energy is the heat emanating from underneath the surface of the earth.

Know the Link

▶ www.importantindia.com/.../conventional-and-non-conventional-sources

Yery Short Answer Type Questions

- A Q. 1. Why should the use of cattle cake as fuel be discouraged?
 - [Board Term-II, (Outside Delhi Set-I) 2015]
- Ans. The use of cattle cake as fuel should be discouraged because :
 - (i) It creates pollution.
- (ii) It consumes most valuable manure which could be used in agriculture. (Any one) 1
- Q. 2. How are 'Gobar Gas Plants' beneficial to the farmers?

[Board Term–II, Outside Delhi, Set–II, 2016]

Ans. 'Gobar Gas Plants' are beneficial to the farmers

Short Answer Type Questions

- Q. 1. "Natural gas is considered an environmentfriendly fuel." Explain the statement in two points. [Board Term-II, 2014]
- **Ans.** Natural gas is used as a source of energy as well as an industrial raw material.
 - (i) It can be transported easily through pipelines.
 - (ii) Pipelines have helped in setting up fertilizer plants and power plants on its way.
 - (iii) Natural gas is a clean source of energy.
 - (iv) It is an environment–friendly fuel because of the low carbon emission. (Any three) 1 × 3 = 3
 [CBSE Marking Scheme, 2014]

UQ. 2. How is geo-thermal energy produced? Explain. [Board Term-II, Set-RKZQI05, 2015]

Ans. The earth grows progressively hotter with increasing depth. Where the geothermal gradient is high, high temperatures are found at shallow depths. Groundwater in such areas absorbs heat from the rocks and becomes hot.

It is so hot that when it rises to the earth's surface, it turns into steam. This steam is used to drive turbines and generate electricity. 3 [CBSE Marking Scheme, 2015] in the form of energy and improved quality of manure.

- A Q. 3. What is biogas energy?
- Ans. Bio gas is produced from shrubs, farm waste, animal and human wastes. 1
- A Q. 4. Name any one nuclear power station found in Tamil Nadu?
- Ans. Kalpakkam.
- A Q. 5.At which place in India, experimental project for geothermal energy has been Set-up?
- Ans. Manikaran. 1
 - (3 marks each)

1

(1 mark each)

- A Q. 3. Describe any three non-conventional sources of energy.

 [Board Term-II, Set-2078, 2012]
- Ans. Non-conventional sources of energy are :
 - (i) Solar Energy: India is a tropical country. It has enormous possibilities of trapping solar energy. Photovoltaic technology converts sunlight directly into electricity. Solar energy is becoming popular in rural and remote areas.
- (ii) Wind Energy: India now ranks as a 'wind super power' in the world. The largest wind farm cluster is located in Tamil Nadu from Nagercoil to Madurai. Apart from these, Andhra Pradesh, Karnataka, Gujarat, Kerala, Maharashtra and Lakshadweep have important wind farms. Nagercoil and Jaisalmer are well-known for effective use of wind energy in the country.
- (iii) **Biogas:** Shrubs, farm waste, animal and human waste are used to produce biogas for domestic consumption in rural areas. Biogas plants using cattle dung are known as 'Gobar Gas Plants' in rural India. These provide twin benefits to the farmer in the form of energy and improved quality of manure. $1 \times 3 = 3$
- A Q. 4. Which are the potential sources of biogas? State any four benefits of biogas.

[Board Term-II, Set-2022, 2012]

Ans. Potential sources of biogas are : Shrubs, farm wastes, animal, human waste, etc.

Four benefits of biogas are :

(i) Its calorific value is high.(ii) It burns without smoke, causing no pollution.

Cong Answer Type Questions

Q. 1. Why is energy needed? How can we conserve energy resources? Explain.

[Board Term-II, Delhi Set-2 2015]

- 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.
 Energy resources such as coal and petroleum need to be conserved because :
- (i) They take millions of years to form.
- (ii) The rate of their consumption is higher than the rate of their production.
- (iii) They contribute in air pollution.
- (iv) We need to save them for our future generation.

(Any three) 2 + 3 = 5[CBSE Marking Scheme, 2015]

- Q. 2. Which minerals are used to obtain nuclear energy? Name all the six nuclear power stations of India. [Board Term–II, (Set-TCJQ6VD) 2016]
- Ans. The minerals which are used to obtain this energy are :
 - (i) Uranium and
 - (ii) Thorium.

The six nuclear power stations of India are :

- (i) Narora nuclear power station
- (ii) Kakrapara nuclear power station
- (iii) Tarapur nuclear power station
- (iv) Kaiga nuclear power station
- (v) Kalpakkam nuclear power station
- (vi) Rawat Bhata nuclear power station $2 + \frac{1}{2} \times 6 = 5$
- A Q. 3. "Conservation of minerals is the need of the hour" support the statement with five facts.

[Board Term-II, Set-KCG34U9; 2016, RKZQI05, 2015]

- Ans. Conservation of minerals is the need of the hour :
 - (i) Minerals are considered to be the backbone of the economy.
- (ii) Industry and agriculture depend on mineral deposits.
- (iii) The substances manufactured from them also depend on mineral deposits.
- (iv) Total volume of workable mineral deposits is very less-only 1% of the earth's crust.
- (v) Mineral resources are being consumed rapidly, and minerals require millions of years to be created and concentrated.

- (iii) It is the cheapest gaseous fuel.
- (iv) Its plants provide twin benefits to the farmer in the form of energy and improved quality of manure. 1 + 2 = 3

[CBSE Marking Scheme, 2012]

- (vi) The geological processes of mineral formation are so slow that the rates of replenishment are infinitely small in comparison to the present rates of consumption.
- (vii) Minerals resources are finite and non-renewable.
- (viii) The rich mineral deposits of our country are extremely valuable but short-lived possessions.

(Any five) $1 \times 5 = 5$

(5 marks each)

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[CBSE Marking Scheme, 2015]
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 Q. 4. "There is a pressing need for using renewable energy sources in India." Justify the statement. [Board Compartment Delhi SA-II, Set I, II, III (2017)]

OR

Why should be use renewable energy resources? Explain with arguments.

[Board Foreign SA-II, Set I (2017)]

Ans. Need to use Renewable Energy Sources are:

- (i) The growing consumption of energy has resulted in the country becoming increasingly dependent on fossil fuels such as coal, oil and gas.
- (ii) Rising prices of oil and gas and their potential shortages have raised uncertainties about the security of energy supply in future.
- (iii) Has serious repercussions on the growth of the national economy.
- (iv) Increasing use of fossil fuels also causes serious environmental problems.
- (v) Hence, there is a pressing need to use renewable energy sources like solar energy, wind, tide, biomass and energy from waste material. $1 \times 5 = 5$
- U Q. 5. 'Energy saved is energy produced'. Asses the statement. [Board Delhi SA-II, Set I (2017)]
- Ans. (i) Use public transport systems instead of individual vehicles.
 - (ii) Use of power saving electrical appliances.
- (iii) Switching off electricity when it is not in use.
- (iv) Using power saving devices.
- (v) Using non-conventional sources of energy.
- (vi) Minimum use of high power consuming electrical gadgets, *i.e.*, Air conditioner, room heaters, etc.(Any five) 1×5=5

High Order Thinking Skills (HOTS) Questions

Q. 1. "Minerals are indispensable part of our lives'. Support the statement with examples. [Board Term–II, (Foreign Set–I, II, III) 2016]

Ans. Minerals are an indispensable part of our lives :

- (i) Almost everything we use, from a tiny pin to a towering building or a big ship, all are made from minerals.
- (ii) The railway lines and the tarmac (paving) of the roads, our implements and machinery too are made from minerals.
- (iii) Cars, buses, trains, aeroplanes are manufactured from minerals and run on power resources derived from the earth.
- (iv) Even the food that we eat contains minerals.
- (v) In all stages of development, human beings have used minerals for their livelihood, decoration, festivities, religious and ceremonial rites.

 $1 \times 5 = 5$ [CBSE Marking Scheme, 2016]

- Q. 2. What efforts are required to use mineral resources in a planned and sustainable manner? Explain in three points. [Board Term-II, Set (68002) 2012]
- Ans. Following efforts have to be made to use mineral in a planned and sustainable manner :
 - (i) Recycling of metals: We should recycle the metal or metal-made products to prevent its scarcity. For example: Used steel blade should be sent for recycling, so that the steel can be used again for other purposes.
 - (ii) Improved technologies need to be evolved : Traditional technologies should be replaced with new and improved technologies, so that the wastages can be minimised.
 - (iii) Use of substitute or alternative resources : The resources which cannot be recycled or reused should be replaced with the recyclable resources, *e.g.*, use of green gas instead of coal for cooking purpose. 1×3=3

[CBSE Marking Scheme, 2012]

Yalue Based Questions

- Q. 1. "There is a pressing need to use renewable energy resources." Justify the statement with suitable arguments. [Board Term-II, Foreign Set–I, II, III, 2016]
- Ans. Need to use renewable energy resources are :
 - (i) The growing consumption of energy has resulted in the country becoming increasingly dependent on fossil fuels such as coal, oil and gas.
 - (ii) Rising prices of oil and gas and their potential shortages have raised uncertainties about the security of energy supply in future.
 - (iii) Has serious repercussions on the growth of the national economy.

Q. 3. 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 to conserve energy? [Board SQP 2016]

Ans. Twin planks/measures :

- (i) Promotion of energy conservation.
- (ii) Increased use of renewable energy sources.As concerned citizens we can do our bit by :
- (i) Using public transport systems instead of individual vehicles.
- (ii) Switching off electricity when not in use.
- (iii) Using power-saving devices.
- (iv) Using non-conventional sources of energy.

(Any two) $2 + \frac{1}{2} \times 2 = 3$

[CBSE Marking Scheme, 2016]

Q. 4. How can solar energy solve the energy problem to some extent in India? Give your opinion.

[Board Term-II, Outside Delhi Set-I, II, III, 2015] OR

Why is solar energy fastly becoming popular in rural and remote areas of India? Explain.

[Board Term-II, 2014]

Ans. (i) India is a tropical country, therefore it receives sunlight in abundance throughout the year.

- (ii) Solar plant can be easily established in rural and remote areas.
- (iii) It will minimise the dependence of rural households on firewood and dung cakes which in turn will contribute to environmental conservation and adequate quantity of manure.

 $1 \times 3 = 3$

[CBSE Marking Scheme, 2014]

- (iv) Increasing use of fossil fuels also causes serious environmental problems.
- (v) Hence, there is a pressing need to use renewable energy sources like solar energy, wind, tide, biomass and energy from waste material.

(Any three) $1 \times 3 = 3$ [CBSE Marking Scheme, 2016]

Q. 2. '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.

[Board Term–II, Outside Delhi Set–I, II, III, 2016]

In the present day energy crisis which step will you like to take for saving energy?

[Board Term-II, Delhi Set-II, 2015]

- Ans. The following steps can be taken for saving energy :
 - (i) Judicious use of energy resources.
 - (ii) Use of public transport/ car pool.
 - (iii) To use bicycle for short distances.
 - (iv) Switching off electrical gadgets when not in use.
 - (v) Regular cleaning of gas burners and switching off the gas regulator when not in use.
 - (vi) Avoid using refrigerator/ A.C. when not needed.
- (vii) Creating awareness in neighbourhood with catchy slogans.
- (viii) As India has been blessed with abundance of sunlight, water, wind and biomass, we must use these to overcome present day energy crisis.

(Any three) $1 \times 3 = 3$ [CBSE Marking Scheme, 2015]

Q. 3. How can biogas solve the energy problem mainly in rural India? Give your suggestions. [Board Term-II, Foreign Set-I, II, III, 2015]

Ans. Biogas to solve energy problem :

- (i) Availability of raw material.
- (ii) Awareness to be created about biogas.
- (iii) It will reduce the burden on conventional sources of energy.
- (iv) Educate the rural people about the use of biogas.
- (v) It is a renewable source of energy.
- (vi) Eco-friendly.
- (vii) Model structures to be introduced by the government agencies at a subsidised rate.

(Any three) $1 \times 3 = 3$ [CBSE Marking Scheme, 2015]

Q. 4. Explain any three values which inspire us to conserve our energy resources.

[Board Term-II, 2014]

Ans. Values:

- (i) Our responsible behaviour will lead us to conserve energy resources.
- (ii) Our sustainable thinking which inspires us to preserve and protect the resources for the future generation.
- (iii) Our consciousness towards our environment will inspire not to over-utilize the resources and exploit them. $1 \times 3 = 3$

[CBSE Marking Scheme, 2014]

Q. 5. 'India is presently one of the least energy efficient countries in the world. We have to adopt cautious approaches for the judicious use of our limited energy resources." Analyse this statement.

> [Board Term-II, 2012, Set-68004] OR

Explain any three steps to be taken to conserve the energy resources.

[Board Term-II, 2012, Set-68005] OR

How can we save our limited energy sources? Suggest any three ways for its judicious use.

- **Ans.** The statement is right to a great extent. Therefore, we need to adopt a cautious approach for the judicious use of energy resources.
 - (i) Use public transport system.
 - (ii) Switch off electricity when not needed.
 - (iii) Use power saving devices.
 - (iv) Use non-conventional sources of energy.

(Any three) 1×3=3 [CBSE Marking Scheme, 2012]