

Mineral and Energy Resources

PART 1

Objective Questions

• Multiple Choice Questions

1. Which of the following features of India has reserves of valuable minerals?

- (a) Peninsular plateau (b) Coastal plains
(c) Northern plains (d) Both (a) and (b)

Ans. (d) Plateau region of Peninsular India and Coastal plains have reserves of valuable minerals.

2. Which of the following river valleys is rich in coal reserves in India?

- (a) Damodar river valley (b) Sone river valley
(c) Mahanadi river valley (d) All of these

Ans. (d) River Valleys like Damodar, Sone, Mahanadi and Godavari have over 97% of coal reserves in India.

3. Which of the following minerals is known as brown diamond? (NCERT)

- (a) Iron (b) Lignite (c) Manganese (d) Mica

Ans. (b) Lignite is a brown coloured coal which is also known as brown diamond.

4. Which of these is a market based oil refinery?

- (a) Digboi (b) Koyali (c) Barauni (d) Tatipaka

Ans. (c) Barauni is a market based oil refinery.

5. Which of the following is not an example of renewable source of energy?

- (a) Wind power (b) Solar power
(c) Hydel power (d) Thermal power

Ans. (d) Thermal power is an example of non-renewable source of energy. This resource cannot be renewed or replenished.

6. Which of the following pairs is not correctly matched?

- (a) Mahanadi river valley – Coal reserves
(b) Krishna-Godavari and Kaveri basins – Crude petroleum reserves
(c) Neyveli – Iron ore mine
(d) Kerala – Monazite

Ans. (c) Neyveli is famous for lignite coal deposit (not iron ore). It is located in Tamil Nadu.

7. Which of the following pairs is not correctly matched?

- (a) Odisha – Kiruburu iron ore mine
(b) Chhattisgarh – Durg iron ore mine
(c) Karnataka – Kurnool iron ore mine
(d) Maharashtra – Chandrapar iron ore mine

Ans. (c) Karnataka has many iron ore mines such as Sandur-Hospet, Baba Budan hills, Kudremukh etc.

Ans. (c) Jharia is the largest (not third largest) coal field in India.

8. Match the following pairs and choose the correct option.

List I (Copper Producing Region)	List II (State)
A. Agnigundala	1. Jharkhand
B. Singhbhum	2. Madhya Pradesh
C. Jhunjhunu	3. Rajasthan
D. Balaghat	4. Andhra Pradesh

Codes

	A	B	C	D
(a)	1	2	4	3
(c)	2	4	3	1
(b)	1	2	3	4
(d)	4	1	2	3

Ans. (c)

9. Match the following columns.

Column I (States)	Column II (Gondwana Coal fields)
A. Madhya Pradesh	1. Singrauli
B. Chhattisgarh	2. Korba
C. Odisha	3. Talcher
D. Maharashtra	4. Bander
E. Telangana	5. Singareni
F. Andhra Pradesh	6. Pandur

Codes

	A	B	C	D	E	F
(a)	1	2	3	4	5	6
(c)	6	1	5	2	3	4
(b)	6	5	4	3	2	1
(d)	5	1	6	2	1	3

Ans. (a)

10. Consider the following statements and choose the correct option from the given options

- I. Minerals support industrial development of a country.
- II. Minerals provide raw material to different industries.

Codes

- (a) Only I is correct
- (b) Only II is correct
- (c) Both the statements are correct
- (d) Both statements are correct and statement II correctly explains the statement I.

Ans. (d) Minerals support industrial development of a country. It is due to the fact that minerals provide raw material to different industries.

11. Consider the following statements and choose the correct option from the given options.

- I. There is inverse relationship between the quantity and quality of minerals.
- II. Good quality minerals are less in quantity and low quality minerals are found in large quantities.

Codes

- (a) Only I is correct
- (b) Only II is correct
- (c) Both statements are incorrect
- (d) Both statements are correct and statement II correctly explains the statement I.

Ans. (d) There is inverse relationship between the quantity and quality of minerals. It is due to the fact that good quality minerals are less in quantity and low quality minerals are found in large quantities.

12. Consider the following statements and choose the correct option for the same.

- I. India is well placed in respect of ferrous minerals both in reserves and production.
- II. Ferrous minerals provide a strong base for development of metallurgical industries.

Codes

- (a) Only I is correct
- (b) Both I and II are correct
- (c) Only II is correct
- (d) Both are incorrect

Ans. (b) Both the statements I and II are correct.

13. Consider the following statements and choose the correct option for the same.

- I. Conventional sources of energy cannot be renewed or replenished.
- II. These resources are exhaustible in nature.

Codes

- (a) Only I is correct
- (b) Both I and II are correct
- (c) Only II is correct
- (d) Both are incorrect

Ans. (b) Both the statements I and II are correct.

14. Arrange the following areas of HVJ pipeline in order from North to South direction.

- I. Hajira
- II. Vijaipur
- III. Jagdishpur
- IV. Shahjahanpur

Codes

- (a) I, II, III, IV
- (b) IV, III, II, I
- (c) III, I, IV, II
- (d) IV, III, I, II

Ans. (b) As per the correct order from north to South direction, the areas of HVJ pipelines are located at Shahjahanpur, Jagdishpur, Vijaipur and Hajira.

15. Arrange the following oil refineries in correct order from North to South directions.

- I. Visakhapatnam
- II. Chennai
- III. Haldia
- IV. Nagapattinam

Codes

- (a) I, II, III, IV
- (b) III, I, II, IV
- (c) IV, III, II, I
- (d) I, IV, III, II

Ans. (b) The correct order of oil refineries from North to South direction is Haldia, Visakhapatnam, Chennai and Nagapattinam.

• Case Based MCQs

16. Read the case/source given and answer the questions that follow by choosing the correct option.

Bauxite is the ore, which is used in manufacturing of aluminium. Bauxite is found mainly in tertiary deposits and is associated with laterite rocks occurring extensively either on the plateau or hill ranges of Peninsular India and also in the coastal tracts of the country.

Odisha happens to be the largest producer of Bauxite. Kalahandi and Sambalpur are the leading producers. The other two areas which have been increasing their production are Bolangir and Koraput. The patlands of Lohardaga in Jharkhand have rich deposits. Gujarat, Chhattisgarh, Madhya Pradesh and Maharashtra are other major producers. Bhavanagar and Jamnagar in Gujarat have the major deposits. Chhattisgarh has bauxite deposits in Amarkantak plateau while Katni-Jabalpur area and Balaghat in M.P. have important deposits of bauxite. Kolaba, Thane, Ratnagiri, Satara, Pune and Kolhapur in Maharashtra are important producers. Tamil Nadu, Karnataka and Goa are minor producers of bauxite.

(i) Bauxite comes in which category of minerals?

- (a) Ferrous minerals
- (b) Non-ferrous minerals
- (c) Non-metallic minerals
- (d) None of these

Ans. (b) Bauxite comes in the category of non-ferrous minerals. These minerals do not have iron content and have high concentration of other metals.

(ii) The mineral extracted from bauxite ore is

- (a) Iron ore (b) Copper
- (c) Aluminium (d) Mica

Ans. (c) Aluminium is extracted from bauxite ore.

(iii) Bauxite fields of Koraput and Bolangir lie in which state?

- (a) Jharkhand (b) Tamil Nadu
- (c) Punjab (d) Odisha

Ans. (d) Bauxite fields of Koraput and Bolangir lie in Odisha.

(iv) Which of the following is a bauxite deposit area in Chhattisgarh?

- (a) Kolaba (b) Amarkantak
- (c) Lohardaga (d) Sambalpur

Ans. (b) Amarkantak is a bauxite area in Chhattisgarh.

17. Read the case/source given and answer the questions that follow by choosing the correct option.

Wind energy is absolutely pollution free, inexhaustible source of energy. The mechanism of energy conversion from blowing wind is simple. The kinetic energy of wind, through turbines is converted into electrical energy. The permanent wind systems such as the trade winds, westerlies and seasonal wind like monsoon have been used as source of energy. Besides these, local winds, land and sea breezes can also be used to produce electricity.

India, already has started generating wind energy. In Rajasthan, Gujarat, Maharashtra and Karnataka, favourable conditions for wind energy exist.

Ocean currents are the store-house of infinite energy. Since the beginning of seventeenth and eighteenth century, persistent efforts were made to create a more efficient energy system from the ceaseless tidal waves and ocean current.

Large tidal waves are known to occur along the West Coast of India. Hence, India has great potential for the development of tidal energy at the coasts but so far these have not yet been utilised.

(i) The energy produced by the tidal power plant is

- (a) non-renewable and inexhaustible
- (b) non-polluting and exhaustible
- (c) non-polluting and renewable
- (d) renewable and exhaustible

Ans. (c) The energy produced by the tidal power plant is non-polluting and renewable.

(ii) Which of the following group consist of non-renewable resources?

- (a) Air, water, wind (b) Coal, air, wood
- (c) Natural gas, sand, clay (d) Coal, oil, iron-ore

Ans. (d) Coal, oil, iron-ore are non-renewable resources.

(iii) In a wind farm, energy is converted into energy with the help of turbines.

- (a) potential, mechanical (b) kinetic, electrical
- (c) electrical, kinetic (d) mechanical, potential

Ans. (b) In a wind farm, kinetic energy is converted into electrical energy with the help of turbines.

(iv) Which of the following is an inexhaustible resource?

- (a) Geothermal (b) Solar energy
- (c) Wind energy (d) All of these

Ans. (d) All the given resources are inexhaustible.

PART 2

Subjective Questions

• Short Answer (SA) Type Questions

1. Explain any three main characteristics of mineral resources. (Delhi 2014)

Ans. The major characteristics of mineral resources are

- (i) Their distribution over the earth's surface is uneven i.e. some regions have rich minerals, whereas others lack behind in availability of minerals.
- (ii) Minerals of good quality are less in amount and minerals of low quality are more in amount on earth. Thus, quality and quantity of minerals have an inverse relationship.

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

2. Describe the uneven distribution of mineral and energy resources in India by giving suitable examples. (Delhi 2012)

Ans. India is a rich country in terms of minerals. However, there is uneven distribution of mineral and energy resources in country.

For example,

- Most of the metallic minerals occur in the Peninsular Plateau region in the old crystalline rocks.
- River valleys of Damodar, Sone, Mahanadi and Godavari have over 97% of coal reserves in India.
- Sedimentary basins of Assam and offshore region in the Arabian Sea (Gujarat and Mumbai High) are famous for their crude petroleum reserves.
- The area to the East of a line joining Mangaluru and Kanpur has most of the major mineral resources of India.
- Mineral are mainly concentrated in three broad belts, namely, the North-Eastern Plateau region, the South-Western Plateau region and the North-Western Plateau region.

3. Describe the mineral belts of India. (All India 2012)

Ans. The minerals belts of India are

- **The North-Eastern Plateau Region** This belt includes the regions of Chhotanagpur (Jharkhand), Odisha plateau, West Bengal and parts of Chhattisgarh. Important minerals here are iron ore, coal, manganese, bauxite and mica.
- **The South-Western Plateau Region** This belt includes Karnataka, Goa and contiguous uplands of Tamil Nadu and Kerala. Ferrous metals and bauxite are concentrated here along with high grade iron ore, manganese and limestone. Neyveli has lignite coal deposits. Deposits of Monazite sand and thorium are found in Kerala. Mines of iron-ore are located in Goa.
- **The North-Western Region** Minerals of this belt are associated with Dharwar rock system found in the Aravali ranges of Rajasthan and parts of Gujarat. Major minerals found in this region are copper and zinc. Rajasthan is rich in building stones i.e. sandstone, granite, marble, fuller's earth and gypsum.

4. 'India has largest iron ore reserves in Asia'. Describe the distribution of iron ore in India.

Ans. The distribution of iron ore in India is

- Iron ore mines of India are found near the coal fields of North-Eastern plateau region which is an advantage for iron and steel industries of India.
- Only a few Indian states have about 95% of total iron ore reserves in India. These states are Odisha, Jharkhand, Karnataka, Maharashtra and Andhra Pradesh.
- Important iron ore producing regions are Sundergarh, Mayurbhanj, Jhar in Odisha, Noamundi and Gua in Poorbi and Paschimi Singhbhum in Jharkhand, Sandur-Hospet region in Karnataka and Kurnool, Anantpur district in Andhra Pradesh.

5. Give two advantages of manganese. Mention four manganese producing states of India. (Delhi 2013)

Ans. The two advantages of manganese are

- (i) It can be easily used as a raw material due to its properties.
- (ii) It is found abundantly in almost all geological formations.

Four manganese producing states of India are

- (i) **Odisha** It is the leading manganese producer in India. Important mines are located in the districts of Bonai, Kendujhar, Sundergarh, Gangpur, Koraput, Kalahandi and Bolangir.
- (ii) **Karnataka** Important mines are located in Dharwar, Bellary, Belgaum, North Canara, Chikmagalur, Shivamogga, Chitradurg and Tumkuru districts.
- (iii) **Maharashtra** Manganese mines are found in Bhandara, Nagpur and Ratnagiri districts.
- (iv) **Madhya Pradesh** Mines are located in a belt that extends through Balaghat, Chhindwara, Nimar-Mandla and Jabua districts.

6. 'Bauxite is found in many parts of India.' Discuss the statement by explaining the area of Bauxite distribution.

Ans. Bauxite ore is found in laterite rocks mostly in the plateau or hilly regions of peninsular India and also in the coastal areas. The distribution of bauxite in India is

- Odisha is the largest producer of Bauxite and important producing areas are Kalahandi, Sambhalpur, Bolangir and Koraput.
- The Patlands of Lohardaga in Jharkhand have rich deposits. Chhattisgarh, Madhya Pradesh, Tamil Nadu and Karnataka are the other important producers of Bauxite.
- Bhavnagar and Jamnagar in Gujarat have the major deposits. Chhattisgarh has bauxite deposits in Amarkantak plateau while Katni-Jabalpur area and Balaghat in Madhya Pradesh have important deposits of bauxite.
- Tamil Nadu, Karnataka and Goa are minor producer of bauxite.

7. Give two advantages of 'copper'. Mention four copper mining areas of India. (Delhi 2013)

Ans. The advantages of copper are

- (i) Copper, due to its alloyable, malleable and ductile properties, is mostly use in electrical industry for making wires, electric motors, transformers and generators.
- (ii) To give strength to jewelleryes, copper is also mixed with gold.

Four copper producing regions of India are

- (i) Copper deposits are mainly found in Singhbhum district in Jharkhand.
- (ii) It is found in Balaghat district of Madhya Pradesh.
- (iii) Alwar, Jhunjhunu, Bhilwara, and Udaipur districts of Rajasthan are producers of copper.

- (iv) Agnigundala in Guntur district of Andhra Pradesh. Chitradurga and Hassan districts of Karnataka and South Arcot district of Tamil Nadu are other producers of copper ore.

8. Give an account of the distribution of mica in India.

Ans. In India, mica is mainly found in Jharkhand, Andhra Pradesh, Rajasthan, Karnataka. The distribution of mica in India is

- In Jharkhand, Hazaribagh plateau produces high quality of mica.
- In Andhra Pradesh, Nellore district is famous for mica production.
- A 320 km long belt from Jaipur to Bhilwara and around Udaipur produces mica in Rajasthan.
- Mysore and Hasan are important mica producers in Karnataka.

9. Give an account of production and use of coal in India.

Ans. About 80% of coal found in India is bituminous coal of non-coking grade. In India, coal is found in two rock sequences

- (i) **Gondwana Fields** It is mainly found in river valleys of Damodar, Godavari, Mahanadi, Sone, etc. The important coal mines are Jharia, Raniganj, Bokaro, Korba, Singareni, etc.
- (ii) **Tertiary Coal Fields** It is found in Western and Eastern region of Himalayas. Meghalaya, Assam, Jammu and Kashmir and Arunachal Pradesh are important states where tertiary coal is produced.

Uses of coal are

- It is mainly used for generation of thermal power.
- It is also used in smelting of iron ore.

10. “The promotion of the use of non-conventional sources of energy in India is the need of the hour.” Support the statement. (Delhi 2016)

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

- Unlike conventional sources of energy, most of the non-conventional energy sources are cheaper and renewable. The limitation and scarcity of fossil fuels have given rise to the urgent need for using the alternative energy sources such as renewable non-conventional energy resources.
- Power from non-conventional and renewable sources is must in order to reduce Carbon Dioxide (CO₂) emissions from the coal-based power plants. Non-conventional resources are environment friendly.
- Locally available non-conventional and renewable power resources like wind and solar can meet local rural energy needs with minimum costs.

Thus, non-conventional energy resources will ensure sustainable development by meeting the needs of the present generation without harming the needs of future generation.

11. Give two advantages of ‘wind energy.’ Mention four states of India having favourable conditions for the development of wind energy. (Delhi 2013)

Ans. Wind energy is a non-conventional source of energy. The advantages of wind energy are

- (i) Wind energy is a clean fuel source. It does not pollute the air as compared to conventional sources like coal.
- (ii) Wind energy is one of the low-cost renewable energy technologies available today. Even without government subsidies, wind energy is a low-cost fuel in many areas of the country.

Four wind power producing states of India are Rajasthan, Gujarat, Maharashtra and Karnataka.

12. Why is it necessary to develop bio-energy in India?

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

Ans. Bio-energy refers to energy derived from biological product which includes agricultural residues, municipal, industrial and other wastes. It is necessary to develop bio-energy in India because

- It is a potential source of energy conversion and can be converted into electrical energy, heat energy or gas for cooking food.
- It can solve the problem of garbage and waste in urban areas as energy can be derived from wastes.
- It can contribute to improving economic life of rural people in developing countries.
- It will enhance self-reliance and can reduce pressure on fuel wood and reduce oil imports.

13. Write an essay on hydel power in India. (NCERT)

Ans. Hydel power is one of the important renewable sources of energy. Here electricity is generated by using potential energy of water. It is more sustained, eco-friendly and cheaper energy after initial cost is taken care of.

India has one of the world's largest potential for hydroelectric power. Its potential is around 84,000 MW. The Brahmaputra basin has the largest possible capacity of hydro power in India followed by Indus and Ganges basin.

First hydroelectric power plants were set up in Darjeeling (West Bengal) and Shivasamudram (Karnataka) in 1897 and 1902, respectively. States like Karnataka, Himachal Pradesh, Punjab, Uttarakhand, Tamil Nadu, Uttar Pradesh, Odisha, etc are the major producers of hydropower generation in India.

The National Hydroelectric Power Corporation (NHPC) is responsible for planning and promoting efficient development of hydroelectric power in the country.

- 14.** “Conservation of minerals is more important than other resources”. Explain by giving three arguments. (All India 2012)

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

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

- 15.** Explain any three methods of conservation of minerals resources in India. (Delhi 2010)

Ans. The methods of conservation of mineral resources in India are

- (i) Adoption of renewable resources in place of exhaustible resources, like solar power, wind, wave, geothermal energy can save our non-renewable resources.
- (ii) Use of recycled scrap metals should be encouraged. It can save the mining of newer metals. In India, scope of recycling scarce metallic minerals like zinc, copper, lead is more because India lacks behind in the availability of these minerals.
- (iii) Substitutes for some precious and scarce metals should be encouraged. It can reduce their consumption.

• Long Answer (LA) Type Questions

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

(Delhi 2009)

Ans. Minerals are classified on the basis of their physical properties and chemical properties such as

- (i) **Metallic Minerals** Metallic minerals are those that are rich in metals. They are used to obtain a variety of metals like copper, gold, iron, etc. Bauxite, iron ore are some examples of metallic minerals. There are two types of metallic minerals i.e. ferrous and non-ferrous. Ferrous minerals include iron, manganese etc. Non-ferrous minerals include copper, bauxite etc.
- (ii) **Non-metallic Minerals** Non-metallic minerals are those that do not have metal components. Non-metallic minerals are mica, limestone, graphite etc.

Features of the three mineral belts are

(i) **North-Eastern Plateau Region**

- It covers Chhotanagpur in Jharkhand, Odisha Plateau, West Bengal and parts of Chhattisgarh.
- It contains minerals such as Iron-ore, coal, manganese, bauxite and mica.

(ii) **South-Western Plateau Region**

- It extends over Karnataka, Goa, Tamil Nadu uplands and Kerala.
- It is rich in ferrous minerals and iron-ore, manganese and limestone. It also contains Neyveli lignite coal.

(iii) **North-Western Region**

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

- 2.** Which are the two main ferrous minerals found in India? Describe four characteristics of each.

Ans. The two main ferrous minerals found in India are iron ore and manganese. These two minerals provide strong base for development of industries in India.

Characteristics of iron-ore in India are

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

Characteristics of manganese in India are:

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

- 3.** What is the use of manganese? Describe the statewise distribution of manganese in India.

(All India 2009)

Ans. The uses of manganese are

- It is used as a raw material in iron and steel industry for smelting of iron-ore.
- It is used in the manufacturing of ferro alloys.

The manganese deposits are mainly found in the rock of Dharwar system. Its statewide distribution is

- **Odisha** It is the largest manganese producer in the country. Most of the manganese mines are located in central part of the iron-ore belt in the state. The mines are located in the districts of Bonai, Kendujhar, Sundergarh, Gangpur, Koraput, Kalahandi and Bolangir.
- **Karnataka** Dharwar, Bellary, Belgaum (Belagavi), North Canara, Chikmagalur, Shivamogga, Chitradurg and Tumakuru are districts having major manganese mines.
- **Madhya Pradesh** Most of the manganese mines in Madhya Pradesh are located in the belt of Balaghat-Chhindwara-Nimar-Mandla and Jabua districts.
- **Maharashtra** In Maharashtra manganese mines are situated away from iron and steel plants. The main mines are located in the districts of Bhandara, Nagpur and Ratnagiri.

Other manganese producing states are Telangana, Goa and Jharkhand.

4. Write a detailed note on the petroleum resources of India. (NCERT)

Ans. All petroleum products are obtained from crude oil. Crude oil is found in sedimentary rocks of tertiary age. In India, Digboi was the only crude oil producing region before Independence.

In 1956, after foundation of Oil and Natural Gas Commission, excavation of oil resources started at a faster pace. In recent years, new oil deposits have been found at the extreme Western and Eastern parts of the country. The distribution of crude oil or petroleum resources in India is

- **North-Eastern Region** It is the oldest oil producing region of India. It extends over vast area in upper Assam valley and Arunachal Pradesh. Important oil fields are Digboi, Naharkatiya, Moran, Rudrasagar, etc.
- **Gujarat Region** The major oil fields of this region are Ankleshwar, Kalol, Nawagam, etc.
- **Mumbai High** It is an oil bearing region about 160 km North-West off the Mumbai coast in the Arabian sea.
- **East-Coastal Region** This region extends over the Krishna, Godavari and Kaveri basin.
- **Western Region** Ankleshwar, Kalol, Mehsana, Nawagam etc are important oil producing regions in Gujarat.

5. “The non-conventional sources of energy in India will provide more sustained and environment friendly energy.” Examine the statement. (All India 2019)

Or “The non-conventional sources of energy will provide more sustained, eco-friendly and cheaper energy if the initial cost is taken care of.” Examine the statement. (All India 2019)

Ans. Non-conventional energy resources involve higher costs in setting up of large plants and equipments. If this cost is taken care of by providing subsidies, discounts and monetary support, the non-conventional energy resources will provide more sustained and environment friendly energy in the following ways

- Non-conventional energy sources are cheaper and renewable. The overall limitation and scarcity of conventional sources has given rise to the urgent need for exploiting alternative energy sources.
- Non-conventional sources are inexhaustible in nature and environment friendly. In comparison, conventional sources like thermal power plants create air and water pollution.
- Non-conventional energy can be made locally also even in small amounts depending upon local needs and availability of resources. This reduces transportation cost.
- Non-conventional energy sources are solar energy wind energy, geothermal energy, biomass energy etc. These are easily available in the country and can be harnessed with the help of modern technology. These sources are capable of regeneration. These can be renewed along with exploitation and hence, always available for us.

6. Nuclear energy is replacing the conventional sources in India. Do you think it as a viable source of energy in future keeping in view the availability of nuclear minerals in India.

Ans. Nuclear energy is replacing the conventional sources of energy in India. Nuclear power plants are being constructed to replace thermal power plant in a phase wise manner. Nuclear energy has multiple benefit over other conventional sources. Country like India, which are deficient in energy resources are promoting nuclear energy to fulfil its demand.

Yes, nuclear energy is a viable source of energy for future keeping in view the availability of nuclear minerals in India due to following reasons

- In nuclear power plant, uranium and thorium are used to generate energy. In India, uranium deposits found in the Dharwar rock system. Its main reserves are in Singhbhum (Jharkhand), Udaipur, Alwar and Jhunjhunu (Rajasthan), etc.
- India has very rich deposits of the thorium in the world, which is the biggest reason for the viability of nuclear energy in India. Thorium is mainly obtained from monazite and ilmenite in the beach sands of India.
- The states which have rich monazite deposits are Kerala, Andhra Pradesh and Odisha.

Institutions such as Atomic Energy Commission and Bhabha Atomic Research Centre are working consistently to extract thorium from monazite in efficient manner, so that India's dependence on conventional sources can be reduced.

7. Explain any three features of the solar energy, tidal energy and geothermal energy resources.

Ans. Solar energy, tidal energy and geothermal energy are renewable energy sources. Important features of these resources are

Features of Solar Energy

- (i) It is the most readily available source of energy. It can be trapped by two methods i.e. photovoltaic cells and solar thermal technology.
- (ii) It is environment friendly and easy to construct.
- (iii) It is generally used in appliances like heaters, crop dryers, cookers, etc.

Features of Tidal Energy

- (i) It refers to energy generated by tapping infinite energy present in ocean currents.
- (ii) Tides are more predictable than the wind and the solar energy. Thus, energy from this can be harnessed more than the other renewable energy sources.
- (iii) India has a long coastline thus has a great potential for the development of tidal energy.

Features of Geothermal Energy

- (i) It refers to energy generated by the magma, hot springs, hot geysers, etc that comes over the earth's surface. The heat energy from these sources can be converted into electrical energy by tapping it.
- (ii) Geothermal energy is gaining importance and can be used as an alternative to conventional energy sources.
- (iii) In Manikaran (Himachal Pradesh), a geothermal energy plant has been commissioned by India.

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

Ans Conservation of minerals resources is essential for development of India because of the following reasons

- In India, mineral resources are unevenly distributed throughout the country, if these resources get extinct, then it will be a huge challenge to fulfil domestic requirement.
- Its conservation is important as large number of industries are dependent completely on mineral resources.
- If mineral resources are not conserved, then we have to import them from other countries which will put huge economical pressure.
- The formation of minerals takes number of years. Moreover, they are finite and non-renewable. Once finished, they take millions of years for their replenishment.
- Every country has a moral responsibility to conserve resources for the future generation, so that, they can also use them for their development.

Hence, efficient and judicious use of minerals is demand of time, if we want to ensure development of India.

• **Case Based Questions**

1. Read the case/source given and answer the following questions.

Metallic minerals are the sources of metals. Iron ore, copper, gold produce metal are included in this category. Metallic minerals are further divided into ferrous and non-ferrous metallic minerals. Ferrous, as you know, refers to iron. All those minerals which have iron content are ferrous such as iron ore itself and those which do not have iron content are non-ferrous such as copper, bauxite, etc. Non-metallic minerals are either organic in origin such as fossil fuels also known as mineral fuels which are derived from the buried animal and plant life such as coal and petroleum. Other type of non-metallic minerals are inorganic in origin such as mica, limestone and graphite, etc. Minerals have certain characteristics. These are unevenly distributed over space. There is inverse relationship in quality and quantity of minerals i.e. good quality minerals are less in quantity as compared to low quality minerals. The third main characteristic is that all minerals are exhaustible over time. These take long to develop geologically and they cannot be replenished immediately at the time of need. Thus, they have to be conserved and not misused as they do not have the second crop.

Most of the metallic minerals in India occur in the peninsular plateau region in the old crystalline rocks. Over 97 per cent of coal reserves occur in the valleys of Damodar, Sone, Mahanadi and Godavari. Petroleum reserves are located in the sedimentary basins of Assam, Gujarat and Mumbai High i.e. off-shore region in the Arabian Sea. New reserves have been located in the Krishna-Godavari and Kaveri basins. Most of the major mineral resources occur to the East of a line linking Mangaluru and Kanpur.

- (i) What do you understand by organic minerals?

Ans. Organic minerals are a type of non-metallic minerals. These are made up of organic matter of buried animals and plants. For example, fossil/mineral fuels like coal, petroleum, etc.

- (ii) India has vast reserves of coal and petroleum but they are found at different locations. Explain in brief.

Ans. It is true that India has vast reserves of coal and petroleum but they are found at different locations. Over 97 per cent of coal reserves occur in the valleys of Damodar, Sone, Mahanadi and Godavari. Petroleum reserves are located in the sedimentary basins of Assam, Gujarat and Mumbai High i.e. off shore region in the Arabian Sea. New reserves have been located in the Krishna-Godavari and Kaveri basins also.

(iii) Classify metallic minerals on the basis of their composition.

Ans. On the basis of composition, metallic minerals are classified into two forms

- (i) **Ferrous Minerals** These minerals are rich in iron content and are an important source of iron.
- (ii) **Non-ferrous Minerals** These minerals do not have iron content and have high proportion of other metals. For e.g. copper, bauxite, etc.

2. Read the case/source given and answer the questions that follow.

India is endowed with fairly abundant resources of iron ore. It has the largest reserve of iron ore in Asia. The two main types of ore found in our country are haematite and magnetite. It has great demand in international market due to its superior quality. The iron ore mines occur in close proximity to the coal fields in the North-Eastern plateau region of the country which adds to their advantage. About 95 per cent of total reserves of iron ore is located in the States of Odisha, Jharkhand, Chhattisgarh, Karnataka, Goa, Telangana, Andhra Pradesh and Tamil Nadu. In Odisha, iron ore occurs in a series of hill ranges in Sundergarh, Mayurbhanj and Jhar.

The important mines are Gurumahisani, Sulaipet, Badampahar (Mayurbhanj), Kiruburu (Kendujhar) and Bonai (Sundergarh). Similar hill ranges, Jharkhand has some of the oldest iron ore mines and most of the iron and steel plants are located around them. Most of the important mines such as Noamundi and Gua are located in Poorbi and Pashchimi Singhbhum districts. This belt further extends to Durg, Dantewara and Bailadila. Dalli and Rajhara in Durg are the important mines of iron ore in the country. In Karnataka, iron ore deposits occur in Sandur-Hospet area of Ballari district, Baba Budan hills and Kudremukh in Chikkamagaluru district and parts of Shivamogga, Chitradurga and Tumakuru districts. The districts of Chandrapur, Bhandara and Ratnagiri in Maharashtra, Karimnagar and Warangal district of

Telangana, Kurnool, Cuddapah and Anantapur districts of Andhra Pradesh, Salem and Nilgiris districts of Tamil Nadu are other iron mining regions. Goa has also emerged as an important producer of iron ore.

(i) What makes India the largest producer in Asia?

Ans. Iron ore is the mineral which makes India the largest producer in Asia. India has the largest reserve of iron-ore in the continent.

(ii) List the iron ore distribution in two significant states that produce it.

Ans. Odisha and Jharkhand are two significant states producing iron ore

- In Odisha, iron ore occurs in a series of hill ranges in Sundergarh, Mayurbhanj and Jhar. Gurumahisani, Sulaipet, Badampahar (Mayurbhanj), Kiruburu (Kendujhar) and Bonai (Sundergarh) are important mines.
- Jharkhand has some of the oldest mines in India. Most of the iron and steel plants are located around these mines. Important iron-ore mines are Noamundi and Gua in Poorbi and Paschimi Singhbhum district.

(iii) Explain the distribution of iron ore in two coastal states of India.

Ans. The distribution of iron ore in two coastal states of India is

- (i) **Karnataka** Iron ore deposits occur in Sandur-Hospet area of Ballari district, Baba Budan hills and Kudremukh in Chikkamagaluru, parts of Shivamogga, Chitradurga and Tumakuru districts.
- (ii) **Maharashtra** Important iron ore deposits are located in Chandrapur, Bhandara and Ratnagiri districts.

3. Read the case/source given and answer the following questions.

Nuclear energy has emerged as a viable source in recent times. Important minerals used for the generation of nuclear energy are uranium and thorium. Uranium deposits occur in the Dharwar rocks. Geographically, uranium ores are known to occur in several locations along the Singhbhum Copper belt. It is also found in Udaipur, Alwar and Jhunjhunu districts of Rajasthan, Durg district of Chhattisgarh, Bhandara district of Maharashtra and Kullu district of Himachal Pradesh. Thorium is mainly obtained from monazite and ilmenite in the beach sands along the coast of Kerala and Tamil Nadu. World's richest monazite deposits occur in Palakkad and Kollam districts of Kerala, near Visakhapatnam in Andhra Pradesh and Mahanadi river delta in Odisha. Atomic Energy Commission

was established in 1948, progress could be made only after the establishment of the Atomic Energy Institute at Trombay in 1954 which was renamed as the Bhabha Atomic Research Centre in 1967. The important nuclear power projects are Tarapur (Maharashtra), Rawatbhata near Kota (Rajasthan), Kalpakkam (Tamil Nadu), Narora (Uttar Pradesh), Kaiga (Karnataka) and Kakrapar (Gujarat).

When the magma from the interior of earth, comes out on the surface, tremendous heat is released. This heat energy can successfully be tapped and converted to electrical energy. Apart from this, the hot water that gushes out through the geyser wells is also used in the generation of thermal energy. It is popularly known as geothermal energy.

This energy is now considered to be one of the key energy sources which can be developed as an alternate source. The hot springs and geysers are being used since medieval period. In India, a geothermal energy plant has been commissioned at Manikaran in Himachal Pradesh.

- (i) Name the minerals essential for producing nuclear fuel.

Ans. Important minerals such as uranium and thorium are used to generate nuclear fuel or energy.

- (ii) Which area in India are sources of minerals used in nuclear energy?

Ans. Areas in India which are sources of minerals (uranium and thorium) used in nuclear energy are

Distribution of Uranium It is found in Dharwar rock system. Important regions are

- **Jharkhand** Along Singhbhum copper belt
- **Rajasthan** Udaipur, Alwar and Jhunjhunu districts

Distribution of Thorium It is mainly obtained from monazite and ilmenite in the beach sands. The states having world's richest monazite deposits are

- **Kerala** Palakkad and Kollam districts
- **Odisha** Mahanadi river delta

- (iii) Explain the energy sources that is tapped from the interior of the earth.

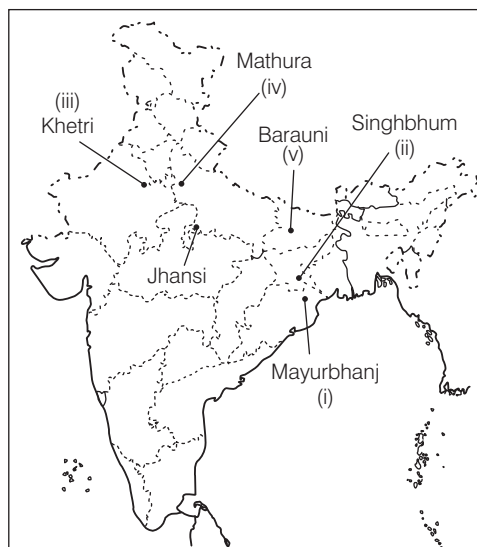
Ans. Geothermal energy is tapped from the interior of the earth. It refers to energy generated by the tremendous heat of magma, that comes over the earth's surface from the interior of earth. This heat energy can be converted into electrical energy. Apart from this, hot water from the geyser wells is also used to generate geothermal energy.

• Map Based Questions

1. On the outline map of India locate and label the following

- (i) Mayurbhanj iron-ore mine (ii) Singhbhum copper mine
(iii) Khetri copper mine (iv) Mathura oil refinery
(v) Barauni oil refinery

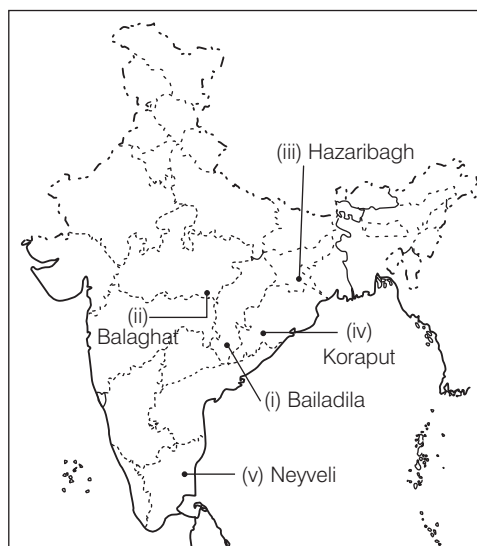
Ans.



2. On the outline map of India locate and label the following

- (i) Bailadila iron ore mine
(ii) Balaghat manganese mine
(iii) Hazaribagh copper mine
(iv) Koraput bauxite mine
(v) Neyveli coal mine

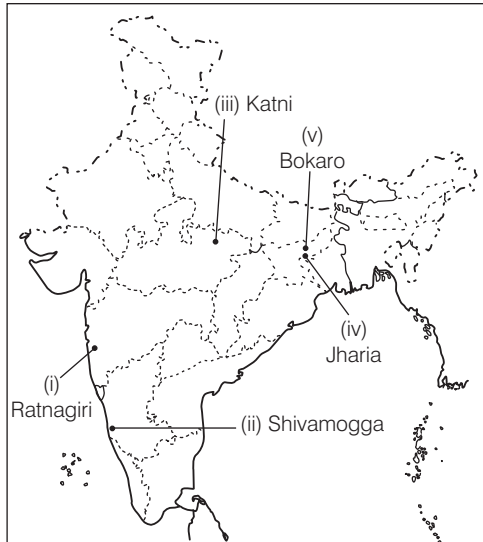
Ans.



3. On the outline map of India locate and label the following

- (i) Ratnagiri iron-ore mine
- (ii) Shivamogga manganese mine
- (iii) Katni bauxite mine
- (iv) Jharia coal mine
- (v) Bokaro coal mine

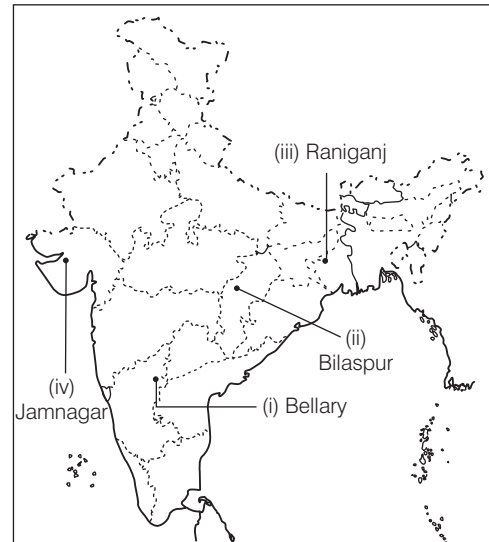
Ans.



4. On the outline map of India locate and label the following

- (i) Bellary iron-ore mine
- (ii) Bilaspur bauxite mine
- (iii) Raniganj coal mine
- (iv) Jamnagar oil refinery

Ans.



Chapter Test

Objective Questions

- The South-Western plateau region is rich in which of the following minerals?
 (a) Iron ore, Manganese, Bauxite (b) Coal, Petroleum, Natural Gas
 (c) Sandstone, Granite, Marble (d) Copper, Mica, Thorium
- Good quality mica is produced in Rajasthan in a 320 km long belt from to and around Udaipur.
 (a) Jaipur, Jhunjhunu (b) Jaipur, Bhilwara (c) Alwar, Jaipur (d) Bhilwara, Jhunjhunu
- Match the following

List I	List II
A. Solar energy	1. Manikaran, H.P.
B. Wind energy	2. Okhla, Delhi
C. Bio-energy	3. Rajasthan
D. Geothermal energy	4. Karnataka

Codes

A	B	C	D	A	B	C	D
(a) 3	4	2	1	(b) 4	1	3	2
(c) 4	3	1	2	(d) 3	2	1	4

- Consider the following question about Natural Gas.
 I. Natural gas is mostly obtained along with crude oil reserves.
 II. In Western Coast of India, some exclusive reserves have also been located.
 Which of the above statements is/are correct ?
 (a) Only I (b) Only II (c) Both I and II (d) None of these
- Which of these oil refineries are correctly arranged from South to North?
 (a) Kochchi, Mumbai, Jamnagar, Mangaluru (b) Jamnagar, Mumbai, Mangaluru, Kochchi
 (c) Kochchi, Mangaluru, Mumbai, Jamnagar (d) Jamnagar, Kochchi, Mangaluru, Mumbai

Short Answer Type Questions

- Mention three distinct characteristics of minerals.
- Give three point of distinction between ferrous and non-ferrous minerals.
- Why is petroleum called liquid gold? Give any three reasons.
- What are the non-conventional sources of energy?
- Why is natural gas called precious gift of nature to man?
- Give three reasons why conservation of minerals is necessary.

Long Answer Type Questions

- Give five points to distinguish between metallic minerals and non-metallic minerals.
- Describe production and distribution of iron-ore in India.
- Explain the distribution of non-ferrous metals in India. Also define characteristics of two important non-ferrous metals.
- Describe the development of nuclear energy in India.

Answers

- (a) Iron ore, Manganese, Bauxite
- (b) Jaipur, Bhilwara
- (a)
- (a) Only I
- (c) Kochchi, Mangaluru, Mumbai, Jamnagar