

5 MINERAL AND ENERGY RESOURCES



- The two main types of iron ore found in our country are haematite and magnetite.
- Orissa is the largest producer of iron ore.
- Orissa is the leading producer of Manganese.
- Orissa is the largest producer of Bauxite.
- Bauxite is the ore which is used in manufacturing of aluminium.
- Copper is alloyable, malleable and ductile. It is mixed with gold to provide strength to jewellery.
- Singareni uses canaries birds to detect deadly carbon monoxide in underground mines.
- Coal is mainly used in the generation of thermal power and smelting of iron ore.
- About 80 per cent of the coal deposits in India is of bituminous type and is of non-coking grade.
- Jharia is the largest coal field in India.
- Petroleum is also called **liquid gold** because of its scarcity and diversified uses.
- Oldest oil well is in Digboi in Assam.
- Largest oil well is Mumbai High.
- Thorium is mainly obtained from monazite beach sands in Kerala.
- The two effective processes to tap solar energy are **photovoltaics** and **solar thermal technology**.
- Largest Wind power plant is at Lamba in Kachchh region of Gujarat.

Q.1 What are minerals? Explain two types of minerals with one example of each.

Ans. **A mineral** is a natural substance of organic or inorganic origin with definite chemical and physical properties. The mineral resources provide base for industrial development.

Classification of minerals:

- Metallic Minerals:** Are those minerals which contain metals and these are of two types:
 - Ferrous Minerals** which contain Iron in it such as Iron, Manganese.
 - Non-Ferrous Minerals** which do not contain iron such as Copper, Bauxite.
- Non-metallic minerals:** Are those minerals which do not contain metals. They are of two types:
 - Organic Fuel Minerals** which are derived from the buried animal and plant life such as Coal and Petroleum.
 - Other (Inorganic) Minerals** such as Mica, Limestone.

Q.2 What are characteristics of minerals?

Ans. Minerals have certain characteristics.

- Minerals 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.
- All minerals are exhaustible over time. These take long to develop geologically and they cannot be replenished immediately at the time of need.

Q.3 Mention any four steps/methods of conservation of minerals.

Ans. The steps are:

- The alternative energy sources like solar power, wind, wave, geothermal energy are inexhaustible resource. These should be developed to replace the exhaustible resources.



- ii. In case of metallic minerals, use of scrap metals will enable recycling of metals. Use of scrap is especially significant in metals like copper, lead and zinc in which India's reserves are low.
- iii. Use of substitutes for scarce metals may also reduce their consumption.
- iv. Export of strategic and scarce minerals must be reduced, so that the existing reserve may be used for a longer period.

Distribution of Minerals in India

Q.3 Describe the three broad belts of mineral concentration and distribution in India.

Ans. Most of the minerals are generally concentrated in three broad belts in India. These belts are:

- i. **The North-Eastern Plateau Region**: This belt covers Chotanagpur (Jharkhand), Orissa Plateau, West Bengal and parts of Chhattisgarh. Major iron and steel industry are located in this region. It has variety of minerals viz. iron ore coal, manganese, bauxite, mica.
- ii. **The South-Western Plateau Region**: This belt extends over Karnataka, Goa and Tamil Nadu and Kerala. This belt is rich in ferrous metals such as iron ore and manganese. Bauxite and limestone are also found. Coal deposits are low. Kerala has deposits of monazite and thorium.
- iii. **The North-Western Region**: This belt extends along Aravali in Rajasthan and part of Gujarat. Copper and zinc are major minerals. Rajasthan is rich in building stones i.e. sandstone, granite, marble. Gujarat is known for its petroleum deposits.
- iv. **Other regions**:
 - a. The Himalayan belt is another mineral belt where copper, lead, zinc, cobalt and tungsten are known to occur. Assam valley has mineral oil deposits.
 - b. Mumbai High has rich oil resources in off-shore-areas.

MINERAL RESOURCES

Distribution of Ferrous minerals:

1. Iron Ore

- a. The two main types of ore found in our country are haematite and magnetite.
- b. About 95 per cent of total reserves of iron ore are located in the States of Orissa, Jharkhand, Chhattisgarh, Karnataka, Goa, Andhra Pradesh and Tamil Nadu.
- c. In Orissa, iron ore occurs in Sundergarh, Mayurbhanj and Jhar.
- d. In Jharkhand Poorbi and Pashchimi Singhbhum districts, Durg.
- e. In Karnataka, iron ore deposits occur in Bellary district, Chikmagalur district.
- f. Goa has also emerged as an important producer of iron ore.

2. Manganese

- a. Manganese is an important raw material for smelting of iron ore
- b. Also used for manufacturing ferro alloys such as steel.
- c. Orissa is the leading producer of Manganese.
- d. Karnataka, Maharashtra and Madhya Pradesh are other 3 states.

Distribution of Other important minerals:

i. Bauxite:

- a. Bauxite is the ore is used in manufacturing of aluminium.
- b. Bauxite is found mainly in laterite rocks of peninsular India and also in the coastal tracts of the country.

- c. Orissa is the largest producer of Bauxite. Jharkhand, Gujarat, Chhattisgarh, Madhya Pradesh and Maharashtra are other major producers.
- ii. **Copper:**
 - a. Copper is an indispensable metal in the electrical industry for making wires, electric motors, transformers and generators.
 - b. It is alloyable, malleable and ductile. It is also mixed with gold to provide strength to jewellery.
 - c. The Copper deposits mainly occur in Jharkhand, Madhya Pradesh and Rajasthan.
- iii. **Mica:**
 - a. Mica is mainly used in the electrical and electronic industries.
 - b. It can be split into very thin sheets which are tough and flexible.
 - c. Mica in India is produced in Jharkhand, Andhra Pradesh and Rajasthan followed by Tamil Nadu, West Bengal and Madhya Pradesh.

CONVENTIONAL ENERGY RESOURCES:

1. **Coal:**
 - a. **Important Uses:**
 - i. Coal is mainly used in the generation of thermal power and also used for smelting of iron ore.
 - b. **Distribution of Coal:**
 - i. Coal occurs in rock sequences mainly of two geological ages, namely **Gondwana and tertiary deposits**.
 - ii. The most important is in Damodar Valley. They lie in Jharkhand-Bengal coal belt. Jharia is the largest coal field followed by Raniganj. The other river valleys associated with coal are Godavari, Mahanadi and Sone.
 - iii. **Tertiary coals** occur in Assam, Arunachal Pradesh, Meghalaya and Nagaland.
 - iv. Besides, the **brown coal or lignite** occurs in the coastal areas of Tamil Nadu, Pondicherry, Gujarat and Jammu and Kashmir.
2. **Petroleum:**
 - a. **Important uses:**
 - i. It is an essential source of energy. (in automobiles, railways and aircraft)
 - ii. Its numerous by-products are processed in petrochemical industries such as fertiliser, synthetic rubber, synthetic fibre, medicines, vaseline, lubricants, wax, soap and cosmetics.
 - b. **Distribution:**
 - i. Crude petroleum occurs in sedimentary rocks of the tertiary period.
 - ii. Before 1956 Digboi in Assam was the only oil producing region.
 - iii. It is produced in Gujarat (Ankaleshwar, Kalol, Mehsana), Mumbai High off shore 160 kms from Mumbai, Krishna-Godavari and Kaveri Basin.
 - c. **Oil Refineries:**
 - i. There are two types of oil refineries in India: (a) field based and (b) market based.
 - ii. Digboi is an example of field based and Barauni is an example of market based refinery.
3. **Natural Gas:**
 - a. It is also emerging as a preferred transport fuel (CNG) and cooking fuel (PNG) at homes.
 - b. Natural Gas is obtained along with oil.
 - c. India's major gas reserves are found in the Mumbai High and Cambay basin. New reserves have been discovered in the Krishna-Godavari basin.

NON-CONVENTIONAL ENERGY RESOURCES

1. Nuclear Energy Resources:

- a. Nuclear energy is obtained from uranium and thorium.
- b. **Uranium** deposits occur in the Dharwar rocks along the Singbhum, Rajasthan, Chhattisgarh, Maharashtra and Himachal Pradesh.
- c. **Thorium** is mainly obtained from monazite beach sands along the coast of Kerala, Tamil Nadu, Andhra Pradesh and Mahanadi river delta in Orissa.
- d. The important nuclear power projects are Tarapur (Maharashtra), Rawatbhata near Kota (Rajasthan), Kalpakkam (Tamil Nadu), Narora (Uttar Pradesh), Kaiga (Karnataka) and Kakrapar (Gujarat).

2. Solar Energy:

- a. Sun rays tapped in photovoltaic cells can be converted into energy, known as solar energy.
- b. Solar thermal technology has some relative advantages over all other non-renewable energy sources.
 - i. It is cost competitive: 7 per cent more effective than coal or oil based plants. It is 10 per cent more effective than nuclear plants.
 - ii. Environment friendly and
 - iii. Easy to construct.
- c. It is generally used more in appliances like heaters, crop dryers, cookers, etc.
- d. The western part of India has greater potential for the development of solar energy in **Gujarat and Rajasthan**.

3. Wind Energy:

- e. Wind energy is absolutely pollution free, inexhaustible source of energy.
- f. The permanent wind systems (the trade winds, westerlies) seasonal wind (monsoon) local winds, land and sea breezes can also be used to produce electricity.
- g. In Rajasthan, Gujarat, Maharashtra and Karnataka, favourable conditions for wind energy exist.
- h. Wind power plant at Lamba in Gujarat in Kachchh is the largest in Asia. Another, wind power plant is located at Tuticorin in Tamil Nadu.

4. Bio-energy:

- i. Bio-energy refers to energy derived from biological products which includes agricultural residues, municipal, industrial and other wastes.
- j. Bio-energy can be converted into electrical energy, heat energy or gas for cooking.
- k. Bio-energy can also process the waste and garbage.
- l. This will improve economic life of rural areas in developing countries, reduce environmental pollution, enhance self-reliance and reduce pressure on fuel wood.
- m. One such project converting municipal waste into energy is Okhla in Delhi.

Differences between conventional sources of energy and non-conventional sources of energy.

- i. Conventional sources of energy such as coal, petroleum, natural gas and nuclear energy are exhaustible raw materials whereas non-conventional sources such as solar, wind, hydro-thermal and biomass are sustainable and renewable resources.
- ii. Conventional sources are unevenly distributed whereas non-conventional sources are more equitably distributed.
- iii. Conventional sources of energy create pollution whereas non-conventional sources are environmental friendly.
- iv. The non-conventional energy sources will provide more sustained, eco-friendly cheaper energy after the initial cost.