CLASS 10 NOTES

GEOGRAPHY

Mineral and Energy Resources

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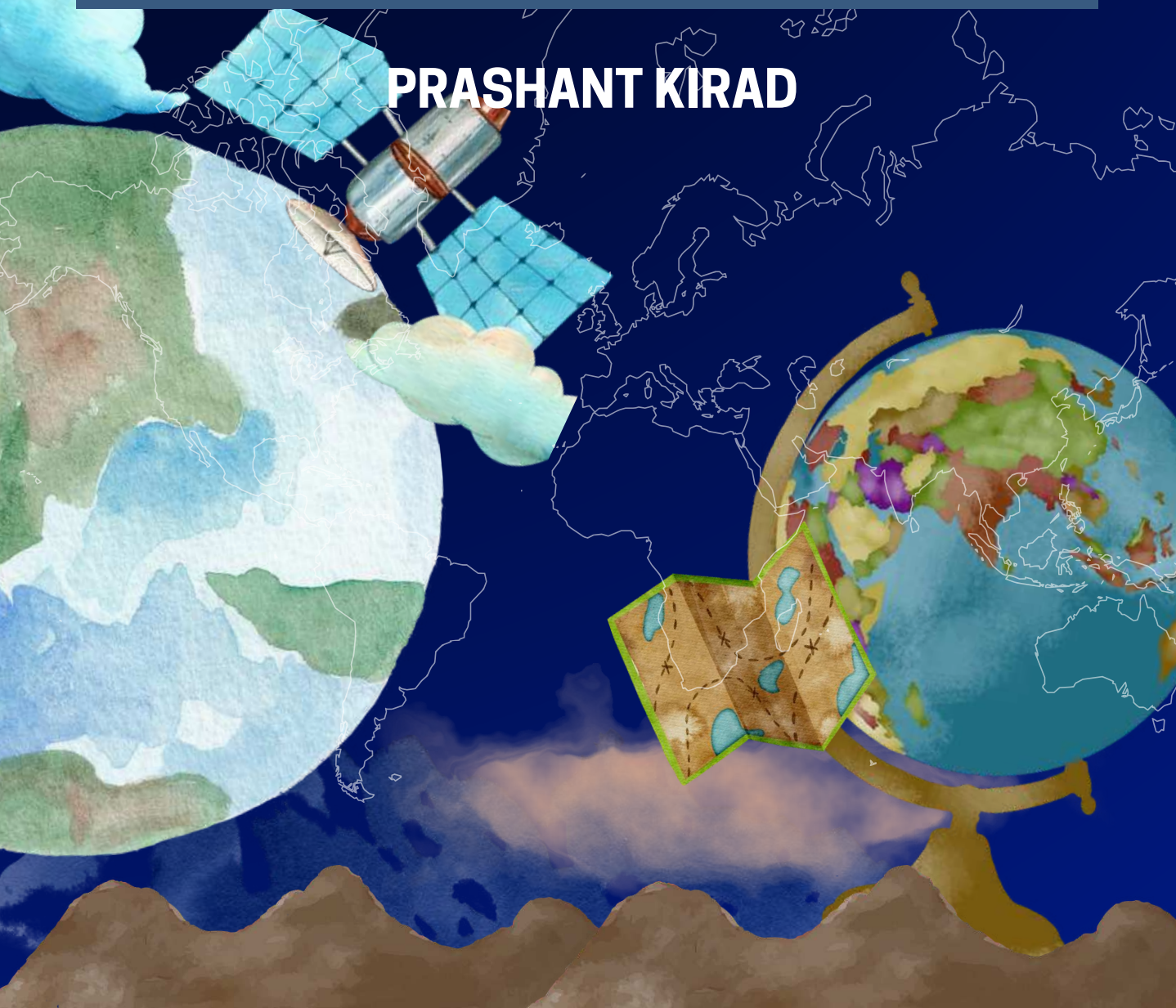


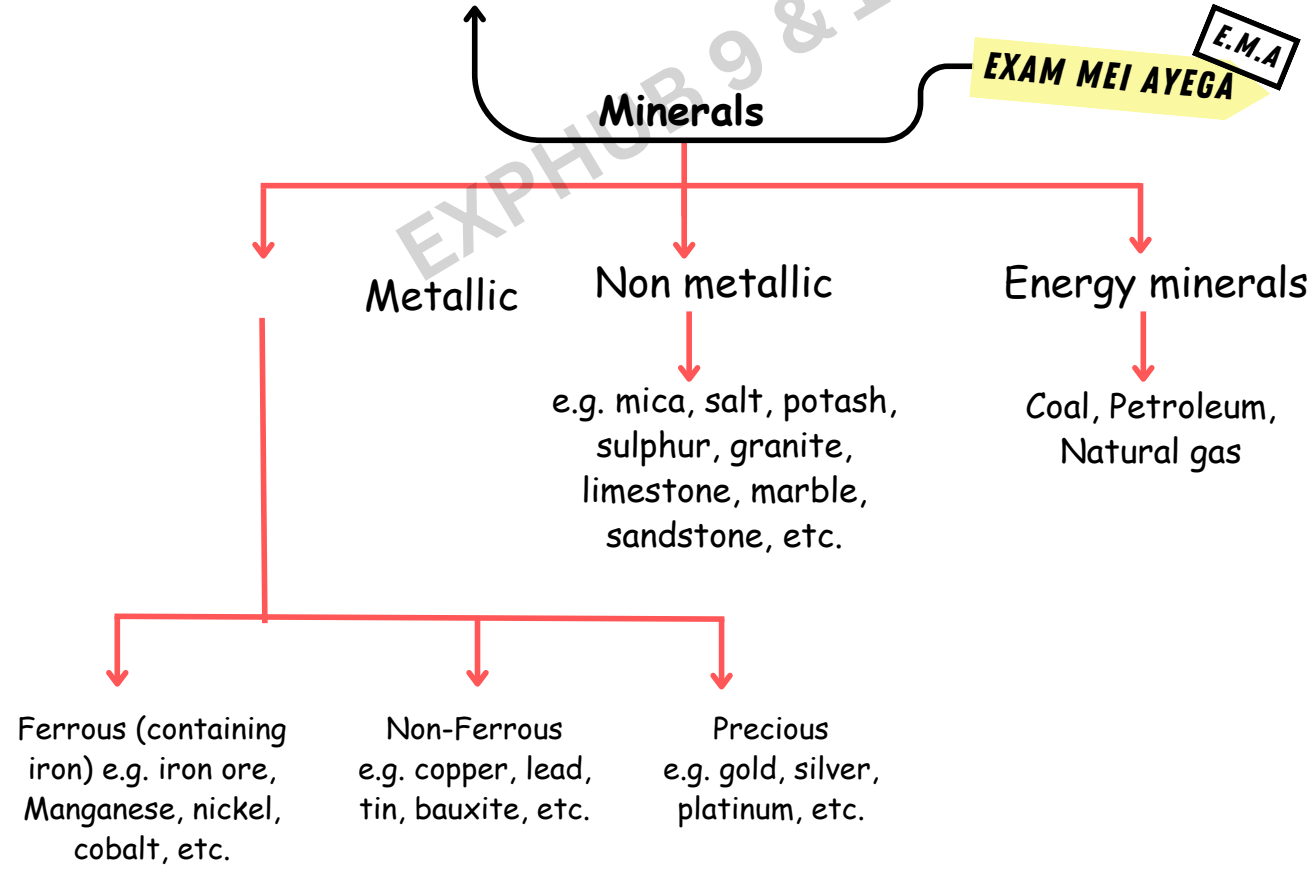
#MINERAL AND ENERGY RESOURCES

Introduction:

Mineral - It is defined as a "homogeneous naturally occurring substance with a definable internal structure."
Minerals are found in varied forms in nature, ranging from the hardest diamond to the softest talc.

Rocks - Rocks are combinations of homogeneous substances called minerals.

Classification of Minerals:



Mode of Occurance of Minerals

- Minerals are usually found in "ores".
- The term 'ore' is used to describe an accumulation of any mineral mixed with other elements.

Minerals generally occur in the following forms:

(i) Veins and Lodes - In igneous and metamorphic rocks, minerals may occur in the cracks, crevices, faults or joints e.g. Copper, Zinc, etc.

(ii) Beds and Layers - In sedimentary rocks, a number of minerals occur in beds or layers. Ex - Gypsum, potash, etc.

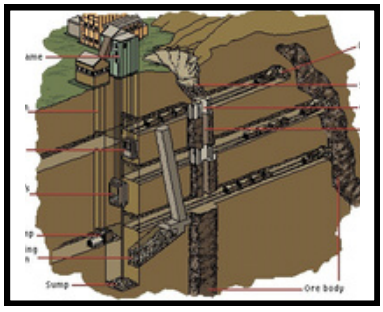
(iii) Residual mass of weathered material - The decomposition of surface rocks and the removal of soluble constituents also form the minerals. Ex - Bauxite.

(iv) Alluvial deposits - Minerals also occur as alluvial deposits in the sands of valley floors and the base of hills. Ex - Gold, tin, platinum, etc.

(v) Ocean water - The ocean waters contain vast quantities of minerals. Ex - Common Salt, magnesium and bromine, etc.

Types of Mining

Open pit Mining



Quarrying

Underground Mining with shaft

Some facts :

- Minerals are nationalised.
- Mining by tribal group [Rat hole]

Distribution of Minerals

E.M.A

- Peninsular Plateau : Peninsular rocks contain most of the reserves of coal, metallic, minerals, mica, non-ferrous mineral and non-metallic minerals.
- Gujarat and Assam : Sedimentary rocks on the Western and Eastern flanks of the Peninsula which are found in Gujarat and Assam have most of the petroleum deposits.
- Rajasthan : Rajasthan with the rock systems of the peninsula has many reserves of non-ferrous minerals.
- Northern Plains : There are very little or no minerals of economic value in vast alluvial pains of the North India.

→ Turning a mineral 'deposit' or 'reserve' into a mine.

Ferrous Minerals

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

Iron Ore

- It is the backbone of the industrial development.
- Magnetite is the finest iron ore with a very high content of iron, up to 70%. It has excellent magnetic qualities.
- Hematite ore is the most important industrial iron ore. It contains 50 to 60% iron.

Manganese

- It is mainly used in the manufacturing of steel and ferro-manganese alloys.
- Nearly 10 kg of manganese is required to manufacture 1 tonne of steel.
- It is also used in manufacturing bleaching powder, insecticides and paints.
- Orissa is the largest producer of manganese.

Major Iron-Ore Belts

- Odisha-Jharkhand Belt
  Hematite are found in Badampahar, Gua and Noamundi
  Port - Paradwip port

- Durg-Bastar-Chandrapur Belt
  Chhattisgarh and Maharashtra
  Hematite ore found in Bailadila range of Bastar district
  Port - Vishakhapatnam [Japan and South Korea]

- Ballari-Chitradurga-Chikkamagaluru-Tumakuru Belt
  Kudermukh Mines is 100% export unit
  Port - Mangaluru [Through pipe line]

- Maharashtra - Goa Belt
  Goa and Ratnagiri district of Maharashtra
  Port - Marmagao

Non-Ferrous Minerals

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- Minerals that do not contain iron content.
- Not sufficient.
- Non-ferrous minerals include copper, bauxite, lead, zinc and gold.
- These minerals play a vital role in a number of metallurgical, engineering and electrical industries.

Copper

- India is critically deficient in copper production.
- A malleable, ductile and good conductor of heat and electricity.
- Mainly used in electrical cables, electronics and chemical industries.
- The Balaghat mines in Madhya Pradesh, the Khetri mines in Rajasthan and the Singhbhum district of Jharkhand are leading producers of copper.

Bauxite

- Bauxite deposits are formed by the decomposition of a wide variety of rocks rich in aluminium silicates.
- Aluminium is obtained from bauxite. Aluminium has good conductivity and great malleability.
- Deposits are mainly found in the Amarkantak plateau, Maikal hills and the plateau region of Bilaspur-Katni.
- Orissa - largest Bauxite producing state.

Non-Metallic Minerals

Mica

- Mica is a mineral made up of a series of plates or leaves. It can be clear, black, green, red, yellow or brown.
- Mica is the most indispensable mineral used in the electric and electronic industries.
- It has excellent di-electric strength, low power loss factor, insulating properties and resistance to high voltage.
- Mica deposits are found on the northern edge of the Chota Nagpur plateau, Gaya-Hazaribagh, Ajmer, Rajasthan and Nellore Mica belt of Andhra Pradesh.

Rock Minerals

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Limestone

- Limestone is found in rocks composed of calcium carbonates or calcium and magnesium carbonates.
- It is the basic raw material for the cement industry and essential for smelting iron ore in the blast furnace.
- Andhra Pradesh, Madhya Pradesh, Rajasthan, Gujarat, Tamil Nadu and many more.

Hazards of Mining

Impact on Miners

(i)Risk of collapsing mine roofs.
(ii)Inundation and fire in coal mines.
(iii)Health issues

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dust and noxious fumes are inhaled.

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Make them vulnerable to pulmonary diseases.

Impact on Environment

(i)Water source get contaminated.
(ii) Dumping of waste and slurry leads to degradation of land, soil and increase in stream and river pollution.

Conservation of Minerals

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Why to conserve minerals?

- Mineral deposits are present in very less quantity in the world i.e. one percent of the earth's crust.
- Continued extraction of ores leads to the depletion of minerals and increase in costs.
- The geological processes of mineral formation are so slow while the consumption rate is very fast therefore, mineral resources are finite and non-renewable.

How to conserve minerals?

- Improved technologies need to be constantly evolved to allow use of low grade ores at low costs.
- Recycling of metals, using scrap metals & other substitutes.

Energy Resources:

- Energy is needed to cook, to provide light and heat, to propel vehicles and to drive machinery in industries.
- It can be generated from fuel minerals like coal, petroleum, natural gas and electricity.

Energy resources can be classified as

- Conventional Sources: It includes firewood, cattle dung cake, coal, petroleum, natural gas and electricity.

- Non-Conventional Sources: It includes solar, wind, tidal, geothermal, biogas and atomic energy.

Conventional Sources of Energy

Coal

- It is the most abundantly available fossil fuel.
- It is used for power generation, to supply energy to the industry as well as for domestic needs.
- Coal is formed due to the compression of plant material over millions of years.
- There are various types of coals on the degree of compression, depth and the time of burial.

On the basis of quality:

(i) Peat: Low carbon and high moisture contents and low heating capacity.

(ii) Lignite: Low grade brown coal, which is soft with high moisture content.

(iii) Bituminous: Buried deep and subjected to increased temperatures. Most popular coal in commercial use.
(iv) Anthracite: Highest quality hard coal.

On the basis of age:

(i) Gondwana Coal
- 200 million years ago
- Damodar valley, Jharia Raniganj, Bokaro

(ii) Tertiary Coal
- 55 million years ago
- North eastern states

Petroleum

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- It provides fuel for heat and lighting, lubricants for machinery and raw materials for a number of manufacturing industries.
- Petroleum refineries act as a "nodal industry" for synthetic textile, fertiliser and numerous chemical industries.
- Mumbai High, Gujarat and Assam are major petroleum production areas in India.

Natural Gas

- It is used as a source of energy as well as an industrial raw material in the petrochemical industry.
- It is considered an environment-friendly fuel because of low carbon emissions.
- Natural gas has been discovered in the Krishna-Godavari basin, Mumbai High and allied fields, Gulf of Cambay, Andaman and Nicobar islands.

Electricity

E.M.A

- It has a wide range of applications in today's world.
- Per Capita Consumption is considered as index of development.

(i) Hydro electricity

- Generated by running water
- Use renewable resources
- Multi-purpose projects like the Bhakra Nangal, Damodar Valley corporation, the Kopili Hydel Project, etc.

(ii) Thermal electricity

- Generated by burning coal, petroleum and natural gas.
- Use non-renewable fossil fuels to generate electricity.

Non-Conventional Sources of Energy

Nuclear or Atomic Energy

E.M.A

- Nuclear Energy is obtained by altering the structure of atoms.
- Uranium and Thorium are used for generating atomic or nuclear power.
- Found in Jharkhand and the Aravalli ranges of Rajasthan.
- The Monazite sands of Kerela are also rich in Thorium.

Solar Energy

- India is a tropical country, therefore it has enormous possibilities of tapping solar energy.
- Photovoltaic technology converts sunlight directly into electricity.

- Solar energy is fast becoming popular in rural and remote areas which helps in minimising the dependence of rural households on firewood and dung cakes that will contribute to environmental conservation and adequate supply of manure in agriculture.

Wind Energy

- India has great potential of wind power.
- The largest wind farm cluster is located in Tamil Nadu from Nagercoil to Madurai.
- Andhra Pradesh, Karnataka, Gujarat, Kerela, Maharashtra and Lakshadweep have important wind farms.

Biogas

- Biogas is a type of biofuel that is naturally produced from the decomposition of organic waste.
- 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.
- Biogas provide twin benefits to the farmer in the form of energy and improved quality of manure with that it also prevents the loss of trees.

Tidal Energy

- Oceanic tides can be used to generate electricity.
- In India, the Gulf of Khambhat, the Gulf of Kuchchh in Gujarat on the western coast and the Gangetic Delta in the Sunderban regions of West Bengal provide ideal conditions for utilising tidal energy.

Geo-thermal Energy

E.M.A

- The heat and electricity produced by using the heat from the interior of the Earth is called Geo-thermal Energy.
- Groundwater in high temperatures area 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.
- Two experimental projects to utilize geothermal energy:

→ Parvati Valley near Manikarn in Himachal Pradesh

→ Puga Valley, Ladakh

Conservation of Energy Resources

E.M.A

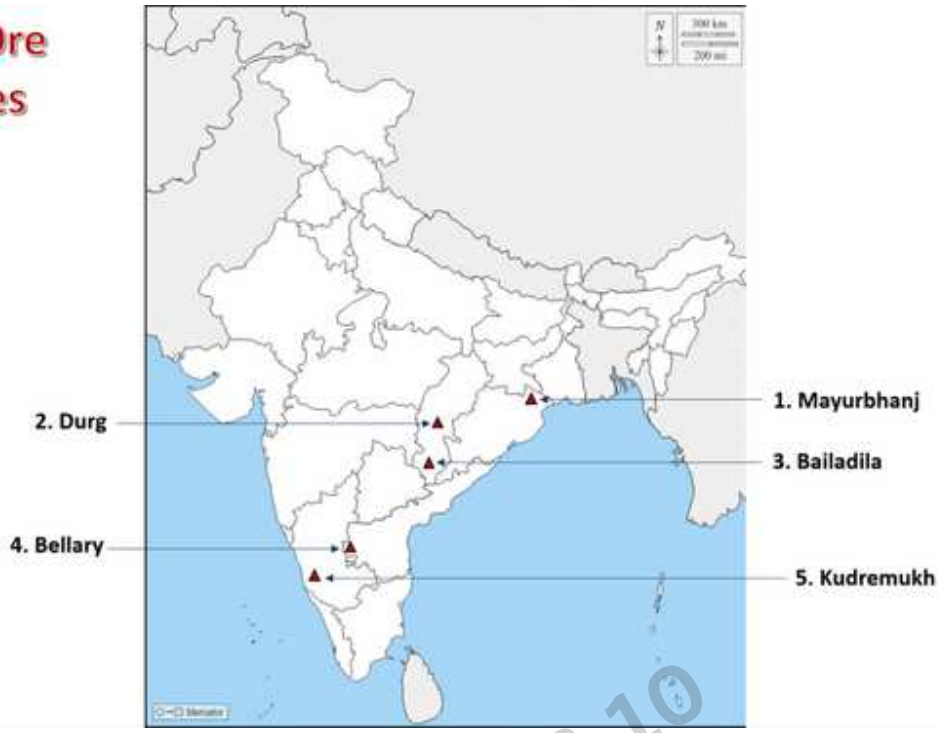
- There is an urgent need to develop a sustainable path for energy development.

Some ways that each one of us can contribute to saving energy resources:

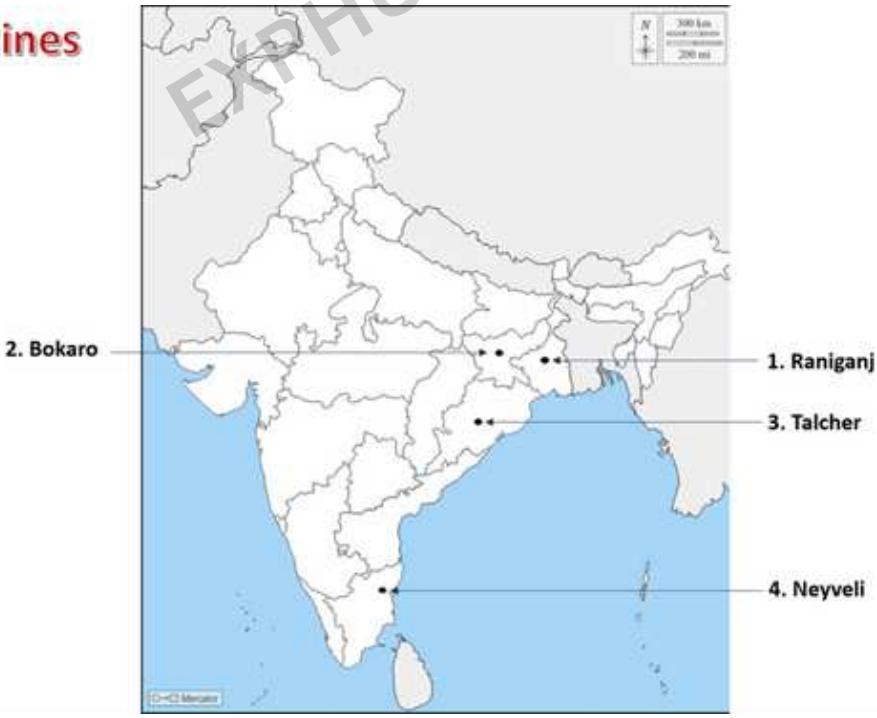
- Using public transport systems instead of individual vehicles
- Switching off electricity when not in use
- Using power-saving devices.
- Using non-conventional sources of energy

Map Work:

Iron Ore Mines



Coal Mines



Oil Fields

Thermal Power Plants

Nuclear Power Plants

Top 7 Questions:

3 markers

1. Which state is the largest producer of manganese in India? Mention any four uses of manganese.

Ans. Odisha is the largest producer of manganese in India.
Uses of manganese are as follows:
(1) It is used in the manufacturing of ferro-manganese alloy.
(ii) It is used in the manufacturing of bleaching powder.
(iii) It is used in insecticides, paint industries and manufacturing of batteries.
(iv) It is used in manufacturing of steel. Nearly 10 kg of manganese is required to manufacture one tonne of steel.

2. Explain the formation of Bauxite and name the metal obtained from it.

Ans. Bauxite is formed by the decomposition of a wide variety of rocks that are rich in aluminium silicates. Intense weathering of the surface rocks helps in their decomposition, thus forming bauxite deposits. The metal obtained from bauxite is aluminium. Alumina occurs in a clay like formation within the bauxite deposits from which aluminium is obtained.

3. What is natural gas? What is its advantage? Name one region of India where its reserves are found.

Ans. Natural gas is an important source of energy. It is an

important clean energy resource found in association with or without petroleum. It is also used as an industrial raw material in the petrochemical industry.

Advantages of natural gas are:

- Natural gas is an environment friendly fuel.
- It generates low carbon dioxide emission during use.
- It is increasingly replacing pollution causing fuels.
- Large reserves of natural gas have been discovered in Krishna-Godavari basin.

4. What are the two main ways of generating electricity? How are they different from each other? Explain.

Ans. The two main ways of generating electricity are by running water (hydro electricity) and by burning fuels (thermal electricity).

Differences between these two are as follows:

Hydro Electricity	Thermal Electricity
• It is generated from fast flowing water falling on turbines.	• It is generated from petroleum, coal and natural gas.
• Its source is perennial or inexhaustible i.e. water.	• Its sources are exhaustible or non renwable sources i.e. coal and petroleum.
• It does not cause pollution.	• The burning of coal and oil cause a lot of pollution.
• It is cheaper in the long-run.	• It is expensive in the long-run.
• These plants should be near the sources of fast flowing water.	• The thermal plants to generate electricity can be set up anywhere.

5. Crude oil reserves are limited all over the world. If people continue to extract it at the present rate, the reserves would last only 35-40 years more. Explain any three ways to solve this problem.

Ans. Crude oil reserves are limited all over the world. If people continue to extract it at the present rate, the reserves would last only 30-40 years more. For energy conservation we can take the following steps:

(i) We have to adopt a cautious approach for the judicious use of our limited energy resources.
(ii) We can use public transport systems instead of individual vehicles.
(iii) We can switch off electricity when not in use, using power saving devices. We can use non-conventional energy like solar energy, wind power, biogas etc. instead of using petroleum.

5 markers

1. "There is a pressing need for using renewable energy sources in India." Justify the statement.

Ans. There is a growing need for increasing the use of renewable energy sources due to the following reasons:

(i) The conventional or non-renewable sources of energy are depleting very fast and we are dependent on imports of petroleum and natural gas to meet our needs.
(ii) Renewable energy sources do not cause environmental pollution with their use and so, to preserve our environment, we must change over to use more of such sources.

(iii) Non-conventional or renewable sources of energy are very economical in use as compared to conventional sources. Thus, to save expenses, we should use renewable energy sources.

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.

Ans. It is justified that the consumption of energy in all forms has been rising all over the country. Energy is a basic requirement for economic development. The strategy of economic development that India adopted since independence necessarily required increasing amount of energy consumption.

To take care of this concern various measures that need to be adopted are as follows:
(i) We need to increase the use of renewable energy resources like solar, wind power, biogas, tidal energy and geothermal energy. This will decrease the dependence on non-renewable sources.
(ii) We have to adopt a cautious approach for judicious use of our limited energy resources. For example, as a concerned citizen, we can use public transport system in place of individual vehicle.
(iii) Another measure that needs to be adopted is promotion of energy conservation, e.g. switching off electrical devices when not in use, using power saving devices.