14. SOURCES OF ENERGY

- Characteristics of a good fuel:
  - (iv) High calorific value
  - (v) Less smoke
  - (vi) Less residue after burning
  - (vii) Easy availability
  - (viii) Inexpensive
  - (ix) Easy to store and transport

- Fossil fuels: were formed millions of years ago, when plants and animal remains got buried under the earth and were subjected to high temperature and pressure conditions. E.g.: Coal, Petroleum, etc.
  These fossil fuels are non renewable sources of energy and cause environmental problems due to pollution.
- Thermal power plants:
  - (i) Use coal, petroleum and natural gas to produce thermal electricity.
  - (ii) Electricity transmission is very efficient.
  - (iii) The steam produced by burning the fossil fuels runs the turbine to produce electricity

- Hydro power plant:

(Refer to figure 14.3, page no. 246 of N.C.E.R.T Text book)

  - (i) It is the most conventional renewable energy source obtained from water falling from a great height.
  - (ii) It is clean & non polluting source of energy.
  - (iii) Dams are constructed to collect water flowing in high altitude rivers. The stored water has a lot of potential energy.
  - (iv) When water is allowed to fall from a height, potential energy changes to kinetic energy, which rotates the turbines to produce electricity.
- Disadvantages of Hydro power plant:
  - (i) Highly expensive to construct.
  - (ii) Dams cannot be constructed on all river sites.
  - (iii) Large areas o human habitation and agricultural fields get submerged.
  - (iv) People face social and environmental problems.

- Non conventional sources:
  - (1) Bio mass:
    - It is the source of the conventionally used fuels that are used in our country. E.g.: Cow dung cakes, fire-wood, coal, charcoal
    - Bio gas: It is a mixture of gases produced during decomposition of bio mass in the absence of Oxygen. (Anaerobic Respiration). Methane is the major component of bio gas.
    - Bio gas plants: Animal dung, sewage, crop residues, vegetable wastes, poultry droppings, etc. are used to produce Bio gas in Bio gas plants.
    - (Refer to figure 14.4, page no. 247 of N.C.E.R.T Text book)
  - (2) Wind energy:
    - It can be converted into mechanical and electrical energy.

- Kinetic energy of the wind is used in running of wind mills, which are used to lift water, grind grains, etc.
- Wind mill-(Refer to figure 14.5, page no. 247 of N.C.E.R.T Text book)
- Advantages: (i) Eco friendly (ii) Renewable
- Disadvantages: (i) Wind speed not uniform always.
  (ii) Needs a large area to erect series of wind mills.
  (iii) Big amount of investment is needed.
  (iv) Out put is less as compared to investment

(3) Solar energy:

- Solar radiations can be converted electricity through solar cells (photovoltaic cells).
- Photovoltaic cells convert solar radiations directly into electricity through silicon solar cells.
- Solar cells arrange on a large flat sheets form a solar panel.
- Solar cookers are painted black from outside and a large glass plate to trap solar radiations by green house effect.
- (Refer to figure 14.6, page no. 249 of N.C.E.R.T Text book)
- Advantages of Solar cookers:
  (i) Eco friendly
  (ii) Renewable
  (iii) Used in rural areas.
  (iv) Retains all the nutrients in food due to slow cooking.
- Disadvantages of solar cooker:
  (i) Silicon cells are expensive.
  (ii) Solar radiations are not uniform over earth's surface.
  (iii) Cannot be used at night or on cloudy days.
  (iv) Cannot be used to make chapattis for frying as these require a temperature of 140^0C or more. (Maximum temperature of 100^0C only can be achieved in a solar cooker)
- Other solar devices- Solar water heater, Solar furnace

(4) Geo thermal energy:

(i) Energy harnessed from the heat of the sun is called Geo thermal energy.

(ii) Magma is formed when this heat melts the rocks. The molten rocks and hot gases are called magma

(iii) The magma gets collected at some depths below the earth's surfaces. These places are called 'Hot spots"

(iv) When underground water comes in contact these hot spots, it changes into steam, which can be used to generate electricity.

- Advantages of Geo thermal energy:
  (i) Renewable
  (ii) Inexpensive
- Disadvantages of Geo thermal energy:
  (i) Only few sites available for harnessing energy.
  (ii) Expensive

(5) Nuclear energy:

(i) Energy released when some changes take place in the nucleus of the atom of a substance, is called Nuclear energy.

(ii) It is used for heat generation, fuel for marine vessels.

- Advantages of Nuclear energy:
  (i) Alternative source of energy due to depletion of fossil fuels.
  (ii) From a small amount of fuel, a large amount of energy is released.
- Disadvantages of Nuclear energy:
  (i) Risk of nuclear waste leakage
  (ii) High cost of setting up of nuclear plant
  (iii) Pollution of environment.

(6) Energy from the sea-

(A) Tidal energy: Locations in India – Gulf of Kutch, Gujrat & W. Bengal

(i) Depends upon harnessing the rise and fall of sea level due to tidal action.

(ii) Dams are constructed across a narrow part of sea and turbine converts tidal energy into electrical energy.

Disadvantages: Uniform tidal action is not seen

(B) Wave energy:

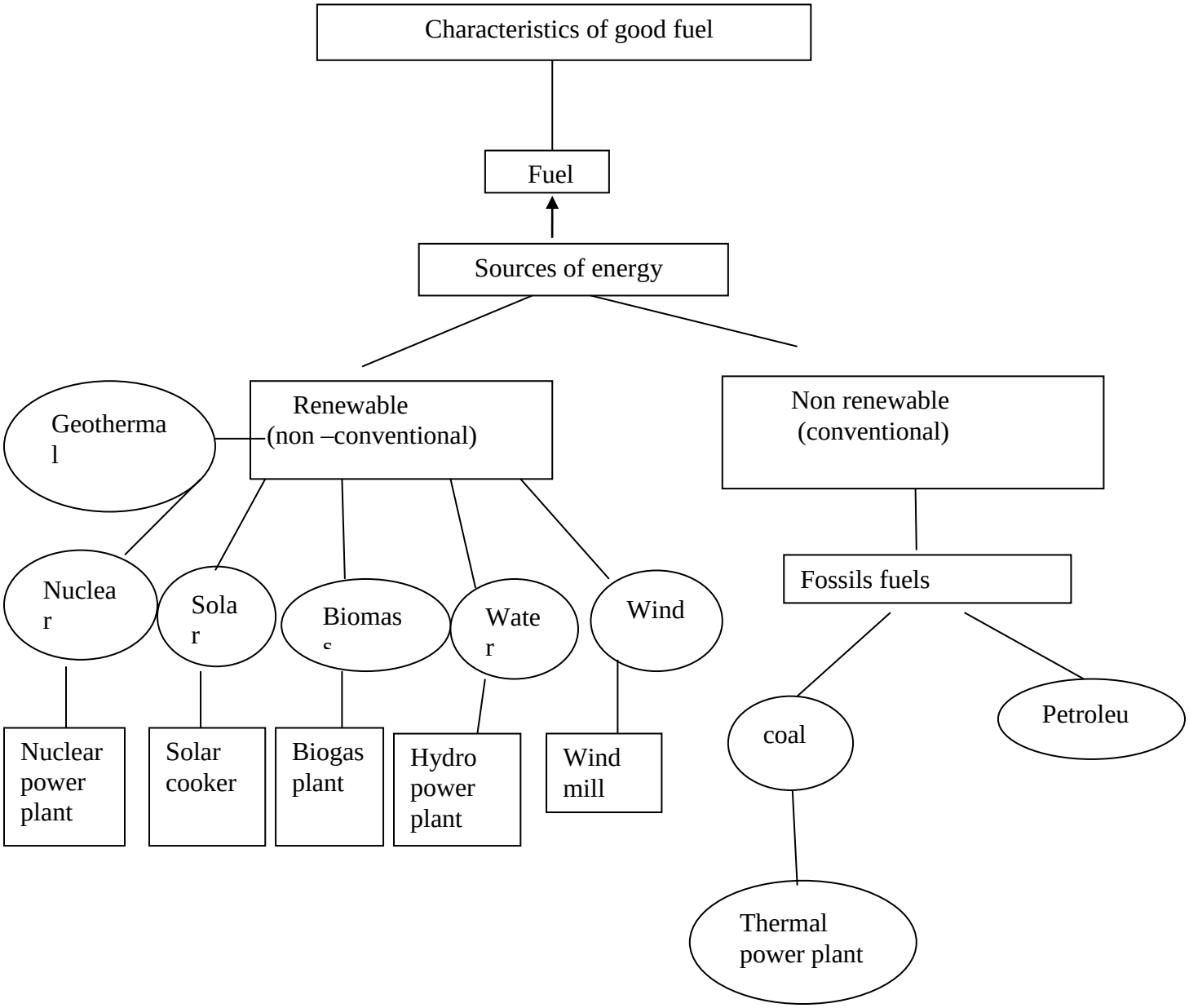
(i) Kinetic energy of the waves of sea are used to rotate turbines..

(ii) These turbines generate electrical energy

❖ **Important diagrams-**

1. Hydro power plant
2. Bio gas plant
3. A wind mill
4. A solar cooker

MIND MAP


Characteristics of good fuel
Fuel
Sources of energy
Renewable (non –conventional)
Non renewable (conventional)
Geothermal
Nuclear
Solar
Biomass
Water
Wind
Fossils fuels
coal
Petroleu
Nuclear power plant
Solar cooker
Biogas plant
Hydro power plant
Wind mill
Thermal power plant

FORMATIVE ASSESSMENT I
Q.PAPER

MARKS-30 TIME- 70 MINUTES

Instructions:

- Questions : 1 to 5 – 1 Mark each
- Questions : 6 to 9 – 2 Marks each
- Questions : 10 to 13 – 3 Marks each
- Question 14 – 5 Marks

1. Name the component of sunlight, exposure to which may cause skin cancer.
2. Flowing water possess which type of energy.
3. Name one place in India where wind energy power station is installed.
4. What is a solar panel?
5. What type of energy transformation takes place during winding of spring of a clock?
6. Write two differences between renewable and non – renewable sources of energy.
7. What is the principle of solar cooker? Name two types of solar cooker.
8. Name any two types of harmful nuclear radiations emitted during nuclear fission.
9. What is thermal power plant? Where it is preferably situated?
10. What is the principle of solar cooker? Give two limitations and two advantages of solar cooker.
11. Name the fuel for hydro power plant. Mention two advantages and disadvantages of producing electricity at the hydro power plant.
12. Explain why:
    a) It is difficult to burn a piece of wood fresh from a tree.
    b) Pouring dry sand over the fire extinguishes it.
    c) It is difficult to use hydrogen as source of energy.
13. What are the different types of energies obtained from sea? Explain.
14. a) What is a principle of Biogas?
    b) Explain it working in brief.
    c) Draw a labelled diagram of biogas.

HOTS QUESTIONS (SOLVED)

1. Name the materials used for making solar cells.

A. Silicon, Germanium and Selenium

2. What fraction of solar energy reaches the earth's surface?

A. 47%

3. Name the process that produces a large amount of energy in the sun.

A. Nuclear fusion

4. Why is biogas called a clean fuel?

A. Because it- (i) leaves no ash (ii) does not cause pollution (iii) does not produce any poisonous gas.

HOTS QUESTIONS (UNSOLVED)

1. What is the use of black painted surface in solar heating devises.
2. Why are bio gas plants considered to be boon to the farmers? Give reason.
3. Hydroelectricity generated at a dam may be considered another form of solar energy. Why?
4. How is the slurry left over after the generation of biogas in biogas plant used?
5. Why is charcoal considered to be a better fuel than wood?
6. Why a solar cooker cannot be used for frying or making chapattis?
7. In parabolic reflector type coolers, even temperature up to 180^0C- 200^0C can be attained. How?
8. Modern chulahs are more efficient than traditional chulahs. Why?
9. How is hydro energy converted into electrical energy?
10. Explain, why only a part of the solar energy that strikes the upper regions of atmosphere reaches the surface of the earth?

ENERGY

ORAL QUESTIONS (CONVERSATION TYPE)

1. a) What is a good source of energy?

   b) Name one good source of energy.

   c) It is a renewable source of energy?

   d) Is it conventional or non – conventional source of energy?

   e) What other name is give to it?

   f) What is a fossil fuel?

   g) Name any other two fossil fuels.

2. a) Which is the ultimate source of all forms of energy?

   b) Can you explain?

   c) Name some renewable source of energy arising due to sun.

   d) Name some non – renewable source of energy arising due to sun.

   e) Why is the energy contained in fossil fuels considered due to sun's energy?