



# PHYSICS

## BOOKS - PRADEEP PHYSICS (HINGLISH)

### SOURCES OF ENERGY

#### Solved Problem

1. How much solar energy is received by  $5m^2$  in 2 hour ? Given solar constant  $= 1.4kW / m^2$ .



[Watch Video Solution](#)

2. If the solar energy received in 5 minutes by  $10m^2$  area is  $4200kJ$ , find the value of solar constant.



[Watch Video Solution](#)

**Ncert Textbook**

1. What is good source of energy ?



**Watch Video Solution**

**2. What is a good fuel ?**



**Watch Video Solution**

**3. If you could use any source of energy for heating your food, which one would you use and why ?**



**Watch Video Solution**

4. What are the disadvantages of fossil fuels ?



**Watch Video Solution**

5. Why are we looking at alternate sources of energy ?



**Watch Video Solution**

6. How has the traditional use of wind and water energy been modified for our convenience ?



**Watch Video Solution**

7. What kind of mirror-concave, convex or plane-would be best suited for use in a solar cooker ? Why ?



**Watch Video Solution**

8. What are the limitations of energy that can be obtained from the oceans ?



**Watch Video Solution**

9. What is geothermal energy ?



**Watch Video Solution**

10. What are the advantages of nuclear energy ?



**Watch Video Solution**

11. Can any source of energy be pollution-free ?

Why or why not ?



Watch Video Solution

12. Hydrogen has been used as a rocket fuel.

Would you consider it a cleaner fuel *CNG* ?

Why or why not ?



Watch Video Solution

13. Name two energy sources that you would consider to be renewable. Give reasons for your choices.



Watch Video Solution

**14.** Give the names of two energy sources that you would consider to be exhaustible. Give reasons for your choices.



**Watch Video Solution**

## **Ncert Exercise**

**1.** A solar water heater cannot be used to get hot water on :



A. a sunny day

B. a cloudy day

C. a hot day

D. a windy day

**Answer: B**



**Watch Video Solution**

**2. Which of the following is not an example of bio-mass energy source ?**

(a) wood

(b) gobar gas

( c) atomic energy

(d) coal.



**Watch Video Solution**

**3.** Most of the sources of energy we use represented stored solar energy. Which of the following is not ultimately derived from the Sun's energy ?

A. geothermal energy

B. wind energy

C. fossil fuels

D. bio-mass

**Answer: A**



**Watch Video Solution**

**4.** Compare and contrast fossil fuels and the Sun as sources of energy.



**Watch Video Solution**

5. Compare and contrast bio-mass and hydro-electricity as sources of energy.



**Watch Video Solution**

6. What are the limitations of extracting energy from :

(a) the wind

(b) waves

( c) tides ?



**Watch Video Solution**

7. On what basis would you classify energy sources as :

(a) renewable and non-renewable ?

(b) exhaustible and inexhaustible ?

Are the options gives in (a) and (b) the same ?



**Watch Video Solution**

8. What are the qualities on an ideal source of energy ?



**Watch Video Solution**

**9.** What are the advantages and disadvantages of using a solar cooker ? Are there places where solar cookers would have limited utility ?



**Watch Video Solution**

**10.** What are the environmental consequences of the increasing demand for energy ? What

steps would you suggest to reduce energy consumption ?



**Watch Video Solution**

## **Exemplar Short Answer**

1. Why is there a need to harness non-conventional sources of energy ? Give two main reasons.



**Watch Video Solution**

2. Write two different ways of harnessing energy from ocean.



**Watch Video Solution**

3. What steps would you suggest to minimise environmental pollution caused by burning of fossil fuels ?



**Watch Video Solution**



4. What is the role of a plane mirror and a glass sheet in a solar cooker ?



**Watch Video Solution**

5. Mention three advantages of a solar cell ?



**Watch Video Solution**

6. What is biomass ? What can be done to obtain bio-energy using biomass ?



[Watch Video Solution](#)

7. What are the limitations on obtaining energy from wind ?



[Watch Video Solution](#)

## Exemplar Long Answer

1. Which is the process used to harness nuclear energy these days ? Explain it briefly.



**Watch Video Solution**

2. How can solar energy be harnessed ?

Mention any two limitations in using solar energy. How are these limitations overcome ?



**Watch Video Solution**

3. Make a list of conventional and non-conventional sources of energy. Give a brief description harnessing one non-conventional source of energy.



[Watch Video Solution](#)

4. Why is there a need to harness non-conventional sources of energy ? How can energy be harnessed from the sea in different ways ?



[Watch Video Solution](#)

5. What are the environmental consequences of using fossil fuels ? Suggest the steps to

minimise the pollution caused by various sources of energy including non-conventional sources of energy.



**Watch Video Solution**

6. Energy from various sources is considered to have been derived from the Sun. Do you agree? Justify your answer.



**Watch Video Solution**

7. What is biomass ? Explain the principle and working of a biogas plant using a labelled schematic diagram.



**Watch Video Solution**

## **Additional Very Short**

1. What is a source of energy ?



**Watch Video Solution**

2. Name some sources of energy ?



**Watch Video Solution**

3. What are the two main categories of sources energy ?



**Watch Video Solution**

4. What is our biggest source of energy ?



**Watch Video Solution**

5. Name two appliances that use solar energy directly.



**Watch Video Solution**

6. Name two indirect ways of using solar energy.



**Watch Video Solution**



7. Why are solar heating devices painted black from inside ?



**Watch Video Solution**

8. What is the use of a glass sheet in solar heating devices ?



**Watch Video Solution**

9. What does a windmill do ?



**Watch Video Solution**

**10.** How is hydroelectric power generated ?



**Watch Video Solution**

**11.** Name the largest component of biogas.



**Watch Video Solution**

**12.** What is slurry ?



[Watch Video Solution](#)

**13.** Name a fraction obtained during refining of petroleum which does not find use as a fuel.



[Watch Video Solution](#)

**14.** Name two gases, other than  $CO_2$ , that are given out during burning of fossil fuels and contribute towards acid rain formation.



[Watch Video Solution](#)

**15.** What is hydro energy ?



**Watch Video Solution**

**16.** What is gasohol ?



**Watch Video Solution**

**17.** Name one non-renewable source of energy.



**Watch Video Solution**

**18.** Name one non-conventional source of energy.



**Watch Video Solution**

**19.** What is cooking gas ?



**Watch Video Solution**

**20.** Which gas is used in transport vehicles ?





[Watch Video Solution](#)

21. Name two types of energy which do not relate to the Sun.



[Watch Video Solution](#)

22. What is the value of solar constant ?



[Watch Video Solution](#)

**23.** What is bagasse ? To what use is it put to ?



**Watch Video Solution**

**24.** How is biogas produced ?



**Watch Video Solution**

**25.** What is coke ? What does it contain ?



**Watch Video Solution**

**26.** Name the product obtained by the fractional distillation of crude oil which is used as a furnace fuel.



**Watch Video Solution**

**27.** Name two products obtained during fractional distillation of petroleum which are used as fuel.



**Watch Video Solution**



**28.** What is the main constituent of petroleum gas ?



**Watch Video Solution**

**29.** Name the constituent which is found in natural gas as well as in biogas.



**Watch Video Solution**

**30.** What are the products obtained on destructive distillation of coal ?



**Watch Video Solution**

**31.** What are fossils ?



**Watch Video Solution**

**32.** What are fossil fuels ?



**Watch Video Solution**

**33.** Who discovered the first nuclear reaction and when ?



**Watch Video Solution**

**34.** Which is most abundant isotope of uranium ?



**Watch Video Solution**

**35.** Name one practical application of nuclear fission.



**Watch Video Solution**

**36.** What is the source of energy in nuclear fission and fusion ?



**Watch Video Solution**

**37.** What is the drawback of energy obtained from fusion ?



**Watch Video Solution**

## **Additional Short Answer**

**1.** What is a source of energy ? What are its essential characteristics ?



**Watch Video Solution**

2. What is the composition of solar energy ?



**Watch Video Solution**

3. What is the cause of ocean thermal energy ?



**Watch Video Solution**

4. What are the advantages of coke over coal ?



**Watch Video Solution**

5. (a) Which is a better fuel : coke or coal ?

(b) Which fuel has the largest calorific value ?



**Watch Video Solution**

6. (a) What is the origin of the word petroleum ?

(b) Which petroleum products are not fuels ?



**Watch Video Solution**

7. (a) What is the source of biomass energy ?

(b) What is the composition of biogas ?



**Watch Video Solution**

8. (a) What is the source of wind energy ?

(b) Where is the world's most powerful wind turbine generator installed ?



**Watch Video Solution**



9. (a) Name of the renewable source of energy ?

(b) Name one conventional source of energy ?



**Watch Video Solution**

10. What is gasohol ? Where is it used ?



**Watch Video Solution**

11. How is fission caused in  $U - 235$  ?



[Watch Video Solution](#)

**12.** State Einstein's mass-energy relation, Give the meaning of each symbol which occurs in it.



[Watch Video Solution](#)

**13. (a)** At what rate is solar energy radiated by the Sun ?

**(b)** How much of this solar energy does our country receive per year ?





[Watch Video Solution](#)

**14.** (a) What does an *SPV* stand for ?

(b) Which countries are the leading users of solar cell panels ?



[Watch Video Solution](#)

**15.** (a) Where is the largest tide-power plant located ?

(b) Where as the world's first *OTEC* plant to be set up ?



[Watch Video Solution](#)

**16.** (a) What are thermal neutrons in the context of nuclear fission ?

(b) What role does a moderator play in a nuclear reactor ?



[Watch Video Solution](#)

**17.** (a) What is the major hurdle in the generation of electrical energy from nuclear

fusion ?

(b) What is the amount of energy released when 1 atom of  $_{92}^{235}\text{U}$  undergoes fission ?



**Watch Video Solution**

**18.** What is a source of energy ? What are its essential characteristics ?



**Watch Video Solution**

**19.** What are renewable and non-renewable sources of energy ? Give examples.



**Watch Video Solution**

**20.** What are fossil fuels ? How were these formed ?



**Watch Video Solution**

**21.** What is *LPG* ? What are its advantages as a fuel ?



**Watch Video Solution**

**22.** What is natural gas ? What are its uses ?



**Watch Video Solution**

**23.** What is a hydroelectric power plant ? Give advantages of hydel power plants over

thermal power and other plants.



**Watch Video Solution**

**24. What is biomass energy ?**



**Watch Video Solution**

**25. What is wind ? How does it arise ? What is wind energy ?**



**Watch Video Solution**



**26.** What is a windmill ? How does it function ?



**Watch Video Solution**

**27.** What is solar energy ? Give five aspects of solar energy.



**Watch Video Solution**

**28.** Describe a concentrator type solar cooker.



**Watch Video Solution**

**29.** What is a solar cell ? Why is silicon used to fabricate solar cells ?



**Watch Video Solution**

**30.** What is tidal energy ? How is it harnessed ?



**Watch Video Solution**

**31.** What is wave energy ? What are its merits and limitations ?



**Watch Video Solution**

**32.** What is geothermal energy ? What are its merits and limitations ?



**Watch Video Solution**

**Additional Long Answer**

1. What is hydel power ? Draw a schematic diagram of a hydroelectric power plant.



**Watch Video Solution**

2. Describe a Fixed Dome Type Biogas plant by drawing its essential features.



**Watch Video Solution**

3. Explain the functioning of a Gas Holder Type Biogas Plant.



**Watch Video Solution**

4. Give the principle, construction and operation of a Box Type Solar Cooker.



**Watch Video Solution**

5. What is a solar panel ? Sketch it.



[Watch Video Solution](#)

6. Explain the phenomenon of nuclear fusion with at least two examples.



[Watch Video Solution](#)

## Higher Order Thinking

1. Out of two solar cookers, one was covered by a plane glass slab and the other was left

open. Which of the two solar cookers will be more efficient and why ?



**Watch Video Solution**

2. What are many thermal power plants set up near coal or oil fields ?



**Watch Video Solution**

3. Justify in one sentence that hydropower (hydel electricity) is a renewable source of

energy.



**Watch Video Solution**

4. Solar cell panels used in satellites to supply energy cannot be used to meet our domestic requirements. Explain why ?



**Watch Video Solution**

5. A student constructed a box type solar cooker. He found that it did not work



efficiently. What could this be due to ? Give any four possible mistakes in the construction and operation of the cooker. What maximum temperature can ordinarily be reached inside a solar cooker ?



**Watch Video Solution**

6. Solar energy can be harnessed directly as well as indirectly. Give two examples of each type.



**Watch Video Solution**

## Value Based Question

1. The calories we burn during exercise come from three different sources : carbohydrates, fat and proteins. The type of fuel our body uses during a workout depends on the nature of the activity performed.

(i) Which of the above mentioned fuel/fuels is (are) used in moderate cycling (10 miles/hour) workout ?

(ii) When is the cycling workout categorised as

vigorous ? Which fuel does it burn then ?

(iii) Which is the least preferred source of energy during exercise ?

(iv) What is importance of exercise in our life ?



**Watch Video Solution**

2. The recent horrific storm surge flooding New Jersey and New York in US by Hurricane Sandy was almost perfectly predicted well in advance, but was more extreme than the average person might expect from a minimal

hurricane. There is a metric that quantifies the energy of a storm based on how far out tropical - storm force winds extend from the centre, known as Integrated Kinetic Energy (IKE).

(i) What is Sandy's ranking in terms of *IKE* among all the hurricanes witnessed so far ?

(ii) What is the *IKE* of sandy ?

(iii) How was sandy different from Hurricane Katrina ?

(iv) Which human value did Sandy generate among the people round the globe ?



**Watch Video Solution**

3. The global climate has always fluctuated.

Millions of years ago, some parts of the world that are now quite warm, were covered with ice, and over recent centuries, average temperature have risen and fallen in cycles.

What is new, however, is that current and future climate change will be caused not just by natural events but also by activities of human beings. Suggest three simple ways to help save our planet.





[Watch Video Solution](#)

4. There are many dangers in the use of nuclear power plants. There have been a number of situations in which these dangers have become real disasters, giving birth to safety and regulatory agencies.

(a) Name three main dangers of nuclear power plants.

(b) How should the nuclear nations conduct themselves to avert these dangers ?



[Watch Video Solution](#)

## Problem For Practice

1. Calculate the heat energy received by  $5m^2$  area on the Earth's surface in 1 minute, assuming that 47 % of the solar energy strikes the Earth's surface.



**Watch Video Solution**

2. The surface area of a concentrator type solar cooker heater is  $5m^2$ . It reflects 80 % of

the radiation incident on it. Calculate the energy concentrated by the heater in 1 hour if the solar energy were delivered to it at the rate of  $0.66 \text{ kW} / \text{m}^2$ .



**Watch Video Solution**

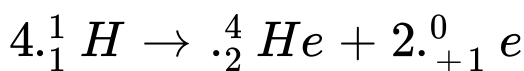
3. How much solar energy is received by  $1 \text{ m}^2$  area on the Earth in 5 minutes, assuming that 47 % of the solar energy strikes the Earth's surface ?



**Watch Video Solution**



4. Calculate the energy released in fusion reaction :



Given : mass of  ${}^1_1 H = 1.007825u$ , mass of  ${}^4_2 He = 4.00260 u$  and  $1u=931.5 \text{ MeV}$

Neglect the mass of positron ( ${}^0_{+1} e$ ).



**Watch Video Solution**

5. If  $1mg$  of  ${}^{235}_{92} U$  is completely destroyed in an atom bomb, how much energy does it

liberate ?



**Watch Video Solution**

6. In one fission of uranium,  $3 \times 10^{-11} J$  of energy is made available. Calculate the number of fissions necessary to generate power of  $15 kW$ .



**Watch Video Solution**

7.  $48\text{kJ}$  of energy is produced per minute in a nuclear. Calculate the number of fissions which would be taking place in the reactor per second, if the energy released per fission is  $3.2 \times 10^{-11}\text{J}$ .



**Watch Video Solution**

**Exemplar Multiple Choice**

1. Which of the following is a non-renewable source of energy ?

A. Wood

B. Sun

C. Fossil fuels

D. Wind

**Answer: C**



**Watch Video Solution**

2. Acid rain happens because :

A. Sun leads to heating of upper layer of atmosphere.

B. burning of fossil fuels releases oxides of carbon, nitrogen and sulphur in the atmosphere

C. electrical charges are produced due to friction amongst clouds

D. Earth's atmosphere contains acids.

**Answer: B**



**Watch Video Solution**

**3. Fuel used in thermal power plants is :**

A. water

B. uranium

C. biomass

D. fossil fuels

**Answer: D**



Watch Video Solution

4. In a hydro power plant :

A. potential energy possessed by stored water is converted into electricity.

B. kinetic energy possessed by stored water is converted into potential energy

C. electricity is extracted from water

D. water is converted into steam to produce electricity.

**Answer: A**



**Watch Video Solution**

**5. Which is the ultimate source of energy ?**

A. water

B. Sun

C. Uranium

D. fossil fuels

**Answer: B**





**Watch Video Solution**

6. Which one of the following forms of energy leads to least environmental pollution in the process of its harnessing and utilisation ?

- A. Nuclear energy
- B. Thermal energy
- C. Solar energy
- D. Geothermal energy

**Answer: C**



Watch Video Solution

7. Ocean thermal energy is due to :

A. energy stored by waves in the ocean

B. temperature difference at different levels in the ocean

C. pressure difference at different levels in the ocean

D. tides arising out in the ocean

**Answer: B**



**Watch Video Solution**

**8.** The major problem in harnessing nuclear energy is how to :

A. split nuclei

B. sustain the reaction

C. dispose off spent fuel safely

D. convert nuclear energy into electrical energy

**Answer: C**



**Watch Video Solution**

**9.** Which part of the solar cooker is responsible for greenhouse effect ?

A. coating with black colour inside the box

B. mirror

C. glass sheet

D. outer cover of the solar cooker

**Answer: C**



**Watch Video Solution**

**10.** The main constituent of biogas is :

A. methane

B. carbon dioxide

C. hydrogen

D. hydrogen sulphide

**Answer: A**



**Watch Video Solution**

**11. The power generated in a windmill :**

A. is more in rainy season since damp air  
would mean more air mass hitting the  
blades

B. depends on the height of the tower

C. depends on wind velocity

D. can be increased by planting tall trees

close to the tower

**Answer: C**



**Watch Video Solution**

**12. Choose the correct statement.**

A. Sun can be taken as an inexhaustible source of energy.

B. There is infinite storage of fossil fuels inside the Earth.

C. Hydro and wind energy plants are non-polluting sources of energy

D. Waste form a nuclear power plant can be easily disposed off.

**Answer: A**



**Watch Video Solution**



**13.** In a hydroelectric power plant more electrical power can be generated if water falls a greater height because :

A. its temperature increases

B. larger amount of potential energy is converted into kinetic energy

C. the electricity content of water increases with height

D. more water molecules dissociate into ions.

**Answer: B**



**Watch Video Solution**

**14.** Choose the incorrect statement regarding wind power.

A. It is expected to harness wind power to maximum in open space.

B. The potential energy content of wind blowing at high altitudes is the source

of wind power.

C. Wind hitting at the blades of a windmill causes them to rotate. The rotation thus achieved can be utilised further

D. One possible method of utilising the energy of rotational motion on the blades of a windmill is to run to turbine of an electric generator.

**Answer: B**



**Watch Video Solution**

**15.** Choose the incorrect statement.

A. We are encouraged to plant more trees so as to ensure clean environment and also provide biomass fuel.

B. Gobar-gas is produces when crops, vegetable wastes etc., decompose in the absence of oxygen.

C. The main ingredient of biogas is ethane and it gives a lot of smoke and also produces a lot of residual ash.

D. Biomass is a renewable source of energy.

**Answer: C**



**Watch Video Solution**

**Mock Test**

1. Which of the following gases is a major constituent of biogas : Carbon monoxide, hydrogen, methane, carbon dioxide ?



**Watch Video Solution**

2. How is the increased demand for energy affecting our environment adversely ?



**Watch Video Solution**

3. "Energy generated by the water stored in a dam can be considered to be another form of solar energy." Comment.



**Watch Video Solution**

4. State two advantages and two limitations of solar energy.



**Watch Video Solution**

5. What are fossils fuels ? Name any three fossil fuels.



**Watch Video Solution**

6.  $1g$  of coal on complete combustion liberates  $18kJ$  of heat. Calculate the amount of coal required to liberate the same amount of heat that an electric heater of  $2kW$  provides in  $1h$ .  
or



Electricity generated by a windmill is another form of solar energy. Explain ?



**Watch Video Solution**

7. In which forms is energy stored in oceans ?

Mention any three forms that could be harnessed to obtain energy in usable form.



**Watch Video Solution**

**8.** What is geothermal energy ? Give three merits of geothermal energy.



**Watch Video Solution**

**9.** Why is biogas considered to be an ideal fuels ? Give four reasons.



**Watch Video Solution**

**10.** Describe the processes that led to the formation of petroleum in nature.



**Watch Video Solution**

**11.** Why is biogas superior or animal dung as a fuel ?



**Watch Video Solution**

**12.** Draw a neat labelled diagram of a biogas plant.



**Watch Video Solution**

**13.** Discuss one limitation each of extracting energy from :

(a) water

(b) wind

( c) ocean.



**Watch Video Solution**

**14.** The recent horrific storm surge flooding New Jersey and New York in US by Hurricane Sandy was almost perfectly predicted well in advance, but was more extreme than the average person might expect from a minimal hurricane. There is a metric that quantifies the energy of a storm based on how far out tropical - storm force winds extend from the centre, known as Integrated Kinetic Energy (IKE).

(i) What is Sandy's ranking in terms of *IKE*

among all the hurricanes witnessed so far ?

(ii) What is the *IKE* of sandy ?

(iii) How was sandy different from Hurricane Katrina ?

(iv) Which human value did Sandy generate among the people round the globe ?



**Watch Video Solution**

**15.** Explain what is meant by anaerobic degradation ?



**Watch Video Solution**

**16.** What causes the wind to blow ? What is a wind energy farm ?



**Watch Video Solution**

**17.** With the help of a neat diagram, explain how the design of a box-type solar cooker ensures minimum loss of heat from its inside.



**Watch Video Solution**

**18.** With the depletion of fossil fuels, we are facing serious energy crisis.

(i) Suggest some whacky funny forms of alternative energy.

(ii) What moral do these funny sources of energy convey ?



**Watch Video Solution**

**19.** Describe the action of a windmill by drawing a simple diagram. How is its energy output used ?





[Watch Video Solution](#)

**20.** Energy from various sources is considered to have been derived from the Sun. Do you agree ? Justify your answer.



[Watch Video Solution](#)