

This question paper contains 4 printed pages]

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S. No. of Question Paper : **5719**

Unique Paper Code : **2174001211**

Name of the Paper : **GE : Energy and the Environment**

Name of the Course : **B.Sc. (Hons.)/B.Sc. (Prog.)**

Semester : **II/IV**

Duration : **3 Hours**

Maximum Marks : **90**

(Write your Roll No. on the top immediately on receipt of this question paper.)

This question paper consists of 8 questions in all.

Attempt any *six* questions.

All questions carry equal marks.

1. (a) Fill in the blanks (any *five*) :

- (i) The gradual increase in Earth's average temperature is called
- (ii) is used as a fuel in nuclear reactors.
- (iii) Windmills convert wind energy into energy.
- (iv) Organic waste can be converted into gas.

P.T.O.

(v) fuels are derived from plants and animals.

(vi) The presence of harmful substances in water is called pollution.

(b) Match the following :

Column (A)	Column (B)
(i) Hydroelectric power	(1) Indicates level of air pollution
(ii) Nuclear fusion	(2) Energy from flowing water
(iii) Wind turbine	(3) Energy from plant and animal waste
(iv) Biomass energy	(4) Combining light nuclei
(v) Air quality index (AQI)	(5) Converts kinetic energy of air into electricity

(c) Assign True/False to the following (any *five*) :

(i) Energy transformation involves conversion from one form of energy to another.

(ii) Hydrogen fuel is considered completely non-polluting under all conditions.

(iii) Geothermal energy is independent of weather conditions.

- (iv) Biofuels can be blended with conventional fuels.
 - (v) Air pollution has no impact on human health.
 - (vi) Waste management can contribute to energy generation. 5,5,5
2. (a) Differentiate between electrical energy and steam energy. Discuss their applications in industry.
- (b) What is the phenomenon of global warming ? Discuss its causes and environmental consequences.
- (c) What is carbon footprint ? What are the methods to reduce individual and industrial carbon footprints ? 5,5,5
3. (a) Define nuclear fusion. Give various reactions involved in the fusion of hydrogen to form helium.
- (b) How is electricity generated in CNG powered thermal power station ? Discuss with suitable diagram.
- (c) How is bioethanol generated in laboratory from glucose ? Give the reactions involved. 5,5,5
4. (a) Give the composition of a lead storage battery.
- (b) Differentiate between hydrothermal fluids and geo-pressured brine.
- (c) What is tidal energy ? Write the advantages and limitations of it. 5,5,5

P.T.O.

5. (a) What are the different uses of hydrogen as energy ?
(b) Discuss how solar energy is used for production of electricity.
(c) Differentiate between thermal reactors and fast breeder reactors. 5,5,5
6. (a) How biogas can be produced ? Describe with a suitable diagram.
(b) How do we classify and utilize underground heat for electricity generation and direct heating ?
(c) Define carbon capture. Write its utilization. 5,5,5
7. (a) A factory emits large amount of SO_2 and NO_x . Suggest suitable chemical remediation methods to control these emissions.
(b) A city experiences a sudden rise in respiratory illnesses during winter. Analyze the possible causes related to air pollution and suggest control measures.
(c) A metropolitan city shows high levels of particulate matter 2.5 (PM_{2.5}). Describe its sources, its health effects and propose any *two* measures to control it. 5,5,5
8. Write short notes on any *three* of the following :
(i) Wind energy and its utility
(ii) Greenhouse gases and their effect
(iii) Zero carbon and low carbon energy systems
(iv) Hidden cost of energy. 5,5,5