B.Sc. 3rd Semester (Honours) Examination, 2019 (CBCS)

Subject : Physics

Paper : SEC-I (Or)

(Renewable Energy and Energy Harvesting)

Time: 2 Hours **Full Marks: 40**

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Group-A

1. Answer *any five* of the following questions: 2×5=10

(a) What are the conventional and non-conventional energy sources?

(b) What is solar tracking system? State its advantages.

(c) What is fill factor of a solar cell?

(d) Why is it necessary to capture carbon from environment?

(e) What are the causes that makes interior of the earth hot?

(f) Write down the characteristics of piezoelectric effect? Name two substances that show piezoelectric effect.

(g) What is electromagnetic energy harvesting? Mention its applications.

(h) What is a penstock in a dam? How does a penstock value work?

Group-B

Answer *any two* of the following questions: 5×2=10

2. (a) What do you mean by solar greenhouse? Briefly discuss the principle of operation of solar greenhouse.

(b) Name two instruments that can measure solar energy.

(c) What is turbine? (1+2)+1+1=5

3. What are the major components of biogas? Briefly discuss the methods of obtaining energy from biogas. 1+4=5

4. (a) Discuss the principle of energy extraction from hot dry rocks.

(b) Why geothermal energy extraction is called heat mining?

(c) Which gas can be obtained from geopressured water? 2+2+1=5

5. (a) Define Ocean biomass.

(b) Discuss one of the technologies of harvesting Ocean energy with diagram. 1+4=5

Group-C

Answer *any two* of the following questions: 10×2=20

6. (a) Write down the basic components of wind energy conversion system.

(b) What are yaw control and pitch control?

(c) What do you mean by wind power?

(d) Show that the power available from a windmill is

$$P = \frac{1}{8}\pi\rho D^2 v^3$$

where ρ denotes the density of wind, D is the motor diameter and v is the wind velocity.

2+3+1+4=10

7. (a) What are components of hydro power plants?

(b) What are the physical quantities upon which the available power from a hydro power plant depend?

(c) A tidal power plant of simple single basin type has a basin area $20 \times 10^6 m^2$. The tidal range is 8 m. Calculate the energy generated in kWh.

(d) Write down the basic principle of ocean thermal energy conversion (OTEC)?

(e) Discuss the impact of hydro power plant on environment. 2+2+3+1+2=10

8. (a) Distinguish between nuclear fission and fusion.

(b) Nuclear fission and fusion — which is more effective and why?

(c) What is cold fusion?

(d) Explain with diagram the working principles of a linear electromagnetic generator.

2+2+1+5=10

9. (a) Why is it necessary to store solar energy?

(b) What is solar pond? How energy is extracted from a solar pond?

(c) Briefly discuss different parts of a solar water heater and their functions. 1+1+4+4=10