

U.G. 3rd Semester Examination-2024**PHYSICS****Skill Enhancement Course (SEC)****Course Code : PHY-SEC-T-03****(Renewable Energy & Energy Harvesting)****[NEP-2020]**

Full Marks : 35

Time : $1\frac{1}{2}$ Hours*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.***GROUP-A**

1. Answer any five questions: $1 \times 5 = 5$
- a) What are the differences between renewable and non-renewable energy?
 - b) Differentiate a Non-Convective Solar Pond from a Shallow Solar Pond.
 - c) What are clean energy sources?
 - d) Write down the limitations of fossil fuel.
 - e) What is secondary energy source? Give example.
 - f) What is a solar cell?

[Turn over]

- g) Calculate the optimum wavelength of light for photovoltaic generation in GaAs cell of energy band of 1.43 eV.
- h) What is meant by artificial piezoelectric material?

GROUP-B

2. Answer any **two** questions: $5 \times 2 = 10$
- a) What is the principle of solar photovoltaic (PV) power generation? What are the main elements of a PV system? $3+2$
- b) Write applications of piezoelectric energy harvesting. 5
- c) What is hydro-energy? Classify the hydropower project based on hydraulic characteristics and on head. $2+1\frac{1}{2}+1\frac{1}{2}$
- d) Write short notes on (any **one**): 5
- Greenhouse effect
 - Open cycle OTEC system (Claude cycle)

GROUP-C

3. Answer any **two** questions: $10 \times 2 = 20$
- a) What is solar pond? Explain the construction and working of solar pond with diagram. What are its different types? $2+(3+3)+2$
- b) i) Write down the resources of geothermal energy.
- ii) Write down the basic idea of liquid dominated system.
- iii) What are the advantages and disadvantages of geothermal energy? $3+3+2+2$
- c) i) Write the basic principle of wind energy conservation.
- ii) Discuss construction and working of a turbine. $5+5$
- d) i) Estimate of energy and power in simple single basin tidal system.
- ii) A tidal power plant of simple single basin type, has a basin area of $30 \times 10^6 \text{ m}^2$. The tide has a range 12 m. The turbine, however, stops operating when head on it falls below 3 m. Calculate energy generated in one filling (or emptying) process, in kWh if the turbine generator efficiency is 0.73. Assuming an average sea water density 1025 kg/m^3 .

iii) What are the Environmental issues generally involved in Hydropower project?

5+3+2
