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: 5×2=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

i) Greenhouse effect

ii) Open cycle OTEC system (Claude cycle)

GROUP-C

3. Answer any two questions: 10×2=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 $30×10^6$ m². 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/m³.

iii) What are the Environmental issues generally involved in Hydropower project? 5+3+2

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