

4. Define *direct* and *indirect* greenhouse gas (GHG) emissions as per the GHG Protocol.
- (a) Name the seven direct GHGs listed under the Kyoto Protocol.
- (b) What is F-gases and why are they significant in the context of GHG emissions?
- (c) List the four indirect GHGs and explain how they contribute to climate change indirectly. Support your answer with a chemical example. $2+2+2+3+1=10$
5. List the features that should be designed to make highly efficient solar cells. Briefly discuss about Tandem cells. $5+5=10$
6. Explain the stages of nuclear fuel cycle. How nuclear wastes can be handled for long period? Discuss the types of nuclear radiation. $4+4+2=10$
7. Explain the structure, functioning, and types of Thin Film Solar Cells (TFSC). Highlight the materials used in different types and their specific advantages in solar applications. $4+4+2=10$
8. Explain the concept and features of Green Buildings and Architecture. How do these features contribute to environmental sustainability and improved human health? Illustrate with suitable examples. $4+4+2=10$

B.Tech Even Semester Examination, May, 2025

Electronics & Communication Engineering

(4th Semester)

Course No: ECE-408

(Energy Science and Engineering)

Full Marks: 50

Pass Marks: 25

Time: 2 hours

Note:

- Attempt any five questions.
 - Begin each answer in a new page
 - Answer parts of a question at a place
 - Assume reasonable data wherever required
 - The figure in the right margin indicates full marks for the question
 - All the mathematical symbols and abbreviations have their usual meanings.
- Compare and contrast the six energy scenarios (A1, A2, A3, B, C1, and C2) in terms of their technological orientation, environmental impact, and compatibility with the goals of sustainable development. Which scenarios are considered most sustainable, and why? $3+3+4=10$
 - Define geothermal energy and explain its four main types. Why is hydrothermal energy the only type currently used on a commercial scale? What factor will most influence the future utilization of geothermal energy? $5+3+2=10$
 - What are the types of wind mills, Explain them? Discuss briefly about the environmental issues that occur by wind mills. Explain the types of ocean energy. $5+3+2=10$