Sustainable Solar Energy Technologies

Unit-1 and Unit-2

1. Discuss different solar energy conversion technologies. Illustrate the solar spectrum and the photo-physical process in solar energy conversion.
2. What are the regions of the solar spectrum? How light energy is converted to electrical energy?
3. Demonstrate the different types of band gap modulations in semiconductors.
4. Enumerate the commercialisation, challenges, and merits of solar energy.
5. Discuss the band structure of solids. Demonstrate the effect of p-n junction in forward and reverse bias.
6. Illustrate the different types of junctions in solar cells. What are the advantages of making heterojunction solar cells?
7. Demonstrate the different methods of preparation of single crystal silica.
8. Enumerate the quantum confinement in semiconductors. Discuss the importance of semiconductor quantum dots in device technologies.
9. Discuss the importance of semiconductors. mention a few devices using semiconductors
10. Categorise the commercially available photo voltaic cells. Demonstrate the construction of Silicon solar cells, dye-sensitised solar cells, and perovskite solar cells.
11. Discuss the difference between regenerative solar cells and photo electrosynthesis cells.
12. Discuss the parameters of solar cell testing.
13. Illustrate the working principles of solar concentrators.
14. Discuss the preparation of solar-grade silica by chemical method.
15. How solar energy is integrated into clean energy production for automobiles. Draw a flow diagram.
16. Discuss how AI, Machine learning, and MATLAB tools are useful in solar technologies.