Utkalmani Gopabandhu Institute of Engineering, Rourkela-4

Dept of Electrical Engineering

LESSON PLAN
(Session: 2022-23)

Course Name: RES (Th4)

Semester: 6th

Prepared By: Nibedita Panda

Course Objectives:

After completion of this subject the student will be able:

1. Power production from pollution free forces and environment friendly resources.
2. Production of power form nature at free of cost.
3. Solar energy conversion is noiseless and cheap.

Chapter 1

Class 1. Introduction to fossil fuels & Environmental consequences of fossil fuel use.

2. Importance of renewable sources of energy.
3. Sustainable Design and development of renewable sources.
4. Classifications of RE sources.
5. Limitations of RE sources.
6. Present Indian and international energy scenario of conventional and RE sources.
7. Government's stand in India to enhance renewable energy sources. (Out of syllabus)

Chapter 2

Class 8. Solar photovoltaic system-Operating principle.

9. Concept of photovoltaic cells.
10. Terminology related to photovoltaic cells.
11. MPPT concept.
12. Continued.
13. Classification of Solar energy sources.
14. Terrestrial radiation.
15. Extraterrestrial radiation.
16. Definition & explanation of Azimuth angle, Zenith Angle, Hour Angle, Irradiation & solar constant.
17. Introduction to Solar collectors & it's classification.
18. Details of solar collectors & it's performance characteristics.
19. Applications of Solar Energy: Photovoltaic - battery charger, domestic lighting

20. Continued: street lighting, water pumping
21. Continued: cooker, Solar Pond.
22. Overall revision with a class test.

Chapter 3

Class 23. Introduction to Wind energy.

24. Wind energy conversion.
25. Continued.
26. Classification of wind turbines
27. Aerodynamics of wind rotors.
28. Wind turbine control systems
29. Basics of Induction and synchronous generators.
30. Grid connected Induction generator operation.
31. Self excited induction generator operation.
32. Constant voltage generation with power electronic control.
33. Constant frequency generation with power electronic control.
34. Single output systems.
35. Double output systems.
36. Characteristics of wind power plant.
37. Application of Wind Power. (Out of syllabus)
38. VAR compensation in wind power plant. (Out of syllabus)

Chapter 4

Class 39. Introduction of energy from Biomass.

40. Biomass as Renewable Energy Source
41. Classification of Biomass Fuels & biomass from solid.
42. Biomass from liquid & gas.
43. Methods to extract biomass. (Combustion)
44. Methods to extract biomass. (Fermentation)
45. Anaerobic digestion.
46. Classification of biogas digester.
47. Wood gassifiers.
48. Pyrolysis & it’s applications.
49. Applications of biomass. (Biogas & Bio diesel)

Chapter 5

Class 50. Tidal Energy: Energy from the tides

51. Barrage and Non Barrage Tidal power system.
52. Ocean Thermal Energy Conversion (OTEC).
53. Introduction to Geothermal Energy & it's Classification.
54. Introduction to Hybrid Energy Systems.
55. Need for Hybrid Systems.
56. Diesel-PV.
57. Wind-PV.
58. Microhydel-PV.
59. Electric vehicles.
60. Hybrid electric vehicles.

Learning Materials:

1. Lecture Notes.
2. Non Conventional Energy sources and Utilisation, RK Rajput (S Chand Publications)