

RANGE OF DIPLOMA DISSERTATION

for main field of study

POWER ENGINEERING

2nd level of education

specialization: ***Renewable Sources of Energy***

1. Insolation: components, sun-path diagram, shading analysis.
2. PV systems: principle of operation, working conditions, types, technology and efficiency.
3. Direct conversion of heat energy to the electric energy: thermoelectricity, thermionics, thermoacoustics - principle of operation, constructional solutions.
4. Waves and tides : characteristics, energy and power, technical solutions.
5. Characteristics of renewable and conventional fuels - comparison.
6. Fuel cells - thermal and electrical analysis.
7. Fuel cells - classification and operating characteristics.
8. Hydrogen - production methods and storage.
9. Model of a hydrothermal - geothermal system.
10. Geothermal exploration program - stages and goals.
11. The use of geothermal energy.
12. Ground source heat pump system – technical solutions and principle of operation
13. Geothermal energy systems - types, technical solutions, principle of operation.
14. Characteristics of thermochemical biomass pre-treatment processes.
15. Biomass utilization systems for energy purposes - characteristics, efficiency.
16. Transport and combustion of biomass – technical solutions.
17. Biomass utilization systems for energy purposes - environmental impacts.
18. Techniques of biomass combustion and co-combustion - exploitation: reliability and safety
19. Wind turbine - types, technical solutions.
20. The physical basis of the wind usage.
21. Wind turbines - regulation systems.
22. Heat pump – thermodynamic cycle .
23. Heat pump – design issues.
24. Heat pump systems– additional equipment.
25. Operating parameters of heating systems based on heat pumps.
26. Bivalent and mono-energetic heat pump working operation condition.
27. Efficiency of energy systems using solar energy.
28. Solar collectors - technical solutions.
29. PV panels - technical solutions.
30. Solar collectors - methods of increasing efficiency.
31. Basis of hydrology - hydrographs, types of rivers, concentration of energy.
32. Hydro-power station - types, principles for determining installed parameters.
33. Universal characteristic curves– reaction turbine design
34. Water turbines - construction and exploitation
35. Biofuels - definition, types, raw materials used in their production
36. The use and benefits of using biofuels.
37. Methods of biofuel production - a method of producing one exemplary type of biofuel.
38. Physical basis of the operation of thermonuclear reactors.
39. Thermonuclear reactors - technical solutions.
40. Thermonuclear power plant - security systems.