

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

**NATIONAL TECHNICAL UNIVERSITY
«KHARKIV POLYTECHNIC INSTITUTE»**

Department	Power stations
Specialty	141 «Electric Power Engineering, Electrical Engineering and Electromechanics»
Educational program	Electric Power Engineering
Form of education	Full-time
Academic discipline	Prospects of Electrical Engineering and Electromechanics Development
Semester	1

**LIST OF QUESTIONS AND TASKS INCLUDED IN THE EXAMINATION
TICKETS FOR THE DISCIPLINE**

Number of tickets _____

Approved at the meeting of the department
Protocol № from 20 .

Head of Department
_____ Oleksandr LAZURENKO

Examiner
_____ Kostiantyn MAKHOTILO

Part 1. Generation

1. Thermonuclear fusion power systems with magnetic and inertial confinement of plasma
2. Renewable tidal and wave energy
3. Power plants using difference in density or temperature of ocean water
4. Tower-less and vertical wind power plants
5. Seasonal thermal energy storage
6. Solar thermal power plants
7. Dye-sensitized and perovskite photovoltaic cells
8. Geothermal power plants.
9. Power generation from landfill and dump gas and heat
10. Hydrogen energy system
11. Gravity energy storage systems
12. Virtual power plants.

Part 2. Transmission

1. AC or DC power systems
2. Reducing energy losses by raising voltage levels in all parts of grid
3. Usage of superconducting cables in power grid
4. Superconducting power substation
5. Power transformer diagnostics, monitoring, and protection systems
6. Connected automated reclosers, sectionalizers and load break Switches
7. Smart Grid
8. Energy Storage in Grids
9. Ultra-high-voltage electricity transmission
10. Usage of a chemically bound heat in district heating
11. Long distance district heating from CHP
12. Wireless power transmission technology

Part 3. Consumption

1. Smart home
2. Active house
3. Prosumers as a new type of consumers
4. Residential thermal energy storage systems
5. Residential (electrical) energy storage systems
6. A new type of consumer – electric vehicle charging stations
7. Integration of electric vehicle battery in electric power grid
8. Hot tap water heating and storage system for individual district heating substation
9. Central heat pump district heating and air conditioning systems
10. LED filament light bulb
11. High-brightness and large emitting area LED
12. Automated demand side power management