**Laboratory facilities**

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| Numberaudience | The name of discipline in whichperformedlaboratorywork | State laboratory | The number of student places | Area (sq.m.) |
| **Lab.205 MMC** | **Automation of technological systems:**1.Lab. Defining the parameters of the semiconductor diode and the construction of its current-voltage characteristics2.Lab. Defining the parameters of the Zener diode and the construction of its current-voltage characteristics3.Lab. Study inclusion schemes transistors with common collector and emittrom4.Lab. Study of inverting amplifier. Research circuits operational amplifiers5.Lab. Rectifiers secondary power sources **Automation of typical electrical installations:**1.Lab. Defining the parameters of the semiconductor diode and the construction of its current-voltage characteristics2.Lab. Defining the parameters of the Zener diode and the construction of its current-voltage characteristics3.Lab. Study inclusion schemes transistors with common collector and emittrom4.Lab. Study of inverting amplifier. Research circuits operational amplifiers5.Lab. Rectifiers secondary power sources**Mathematics and computer modeling in the electric power:**Lab.1 "An approximate solution of the equation by dichotomy (bisection) and the method of simple iterations"Lab.2 "Solving systems of linear equations by Gauss'Lab.3 "Solving systems of nonlinear equations of Newton's method"Lab.4 "Linear programming problem"Lab.5 "Scanning method as the method for solving linear programming problems"**Industrial electronics:**1 Lab. Design and management of the physical model of a gas turbine power plant. The survey gauges and Presentation2. Lab. The study single-control system3. Lab. Setting regulator CAP ET speed4. Lab. Evaluation of the quality control process. Selecting the type of controller5. Lab. Functional diagram of a gas turbine power plant automation **Linear systems management:**Lab.1 Introduction to the modeling program VisSimLab.2 Differential EquationsLab.3 Synthesis of linear automatic control frequency methodLab.4 Checking stability of dynamical systems on algebraic and frequency criteriaLab.5 study the properties of the state observer **Microprocessor tools and systems:**Lab.1 study logic, the implementation of logic functions using logic elementsLab.2 Synthesis of logic circuits that perform specified logic functionsLab.3 study of the structure and algorithms of asynchronous and synchronous triggersLab.4 Research function transitions excitation of the main types of triggers, as well as the study of the interchangeability of different types of triggersLab.5 study of the structure and the study of the work of summing and subtracting counters.Studying ways to counter Lab.6 conversion rate changes**The theory of linear automatic control systems :**Lab.1 Introduction to the modeling program VisSimDifferential EquationsSynthesis of linear automatic control frequency methodCheck the stability of dynamical systems on algebraic and frequency criteriaLab.2 study the properties of the state observer Microprocessor technology:Lab.3 Logic system and functionLab.4 flip-flopLab.5 CountersLab.6 Research decodersLab.7 Research multiplexers**Engineering and Computer Graphics:**Lab.1 Projection methods: central and parallel, orthogonal (as a special case of parallel). Building a perspective view point. Construction of the complex drawing point and a straight line (diagrams Monge). Total direct and private position in space. The relative position of the lines. Solvingproblems.Lab.2 Basic positional problem on the relative position of points, lines planes (Accessory, parallelism, intersection). Solving problems. Polyhedra. Graphic workLab.3 methods convert the drawing. replacement of the projection plane method. The decision metric problems (definition of distances and angles between geometric images).Lab.4 surfaces. Build skeletons ruled surfaces and surfaces of revolution essays. Execution of drawings on a specialty. Operating and installation drawing of the PCB. Assembly drawing of the PCB. Drawing up specifications for the assembly drawing.Lab.5 Introduction to AutoCad. Appointment possible fields of application. Input commands and parameters. Basic skills. Formation of two-dimensional primitives. Editing 2-dimensional primitives. Create a new layer, the purpose of the color, thickness and line type in a layer. MakingtechnicaldrawingsinAutoCadsystem. | Satisfactory.There are instructions when working on electrical installations and devices. Lightingandsafetymeetthestandards. Groundingset.Therearesafetymagazines. | 16 seats | 30 sq.m. |
| **Lab.205aMMC** | **Power converters of energy:**Lab.1. Full-scale simulation of AC mainsLab.2. Defining characteristics of the regulated three-phase bridge controlled rectifier operating at the active-inductive loadLab.3. Determination of the natural external characteristic of a three-phase bridge controlled rectifier.Lab.4. Determination of the natural characteristics of the input three-phase bridge inverter dependent.Lab.5. Full-scale simulation of parallel operation of single-phase bridge uncontrolled rectifier and inverter on the DC machine. **Conversion equipment:**Lab.1. Full-scale simulation of basic circuits uncontrolled and controlled rectifiersLab.2. Determination of adjusting the characteristics of three-phase bridge controlled rectifier operating in an active-inductive loadLab.3. Determination of the natural external characteristic of a three-phase bridge controlled rectifierLab.4. Determination of parameters and indicators characterizing the operation of three-phase bridge inverter dependentLab.5. Full-scale simulation of parallel operation of single-phase bridge uncontrolled rectifier and inverter to the car DC | Satisfactory.There are instructions when working on electrical installations and devices. Lightingandsafetymeetthestandards. Groundingset.Therearesafetymagazines. | 12 seats | 20,8 sq.m. |
| **Lab.217MMC** | **Electrical Engineering:**Lab.1. Manual connection of synchronous generator Network precise synchronization methodLab.2. Determination of the angular synchronous generator characteristicsLab.3. Simulation of steady state operation of the electrical network with a single feedLab.4. Study scheme Connection measuring current transformersLab.5. Determination of the time limit off the short-circuit**Electric power networks and systems:**Lab.1. Construction elements of overhead and cable linesLab.2. Simulation of steady state operation with a dual feed phase mainsLab.3. Simulation of steady state operation the three-phase mains single feedLab.4. Simulation of steady state operation phase of the long transmission line with a quarter of the wavelength of the electrical system connecting the loadLab.5. Simulation of steady state operation long power line phase and a quarter wavelength connecting powerful electrical system**Electric power plants and substations:**Lab.1. current transformer connection schemesLab.2. voltage transformer connection schemesLab.3. Protection of power transformersLab.4. Protection of power generators**Electrical power:**Lab.1. current transformer connection schemesLab.2. voltage transformer connection schemesLab.3. Protection of power transformersLab.4. Protection of power generators**Modes of power systems and power lines:**Lab.1. Construction elements of overhead and cable linesLab.2. Simulation of steady state operation with a dual feed phase mainsLab.3. Simulation of steady state operation the three-phase mains single feedLab.4. Simulation of steady state operation phase of the long transmission line with a quarter of the wavelength of the electrical system connecting the loadLab.5. Simulation of steady state operation long power line phase and a quarter wavelength connecting powerful electrical system**Stand-alone power supply system:**Lab.1. Research schemes include secondary windings of the current transformersLab.2. Research overcurrent protection using an induction current relayLab.3. Study modes AC power line when the load power factorLab.4. protection relay test down tranformatoraLab.5. protection relay test high-voltage motor**Relay electrical protection:**Lab.1. Transformer differential protectionLab.2. Overcurrent protection transformerLab.3. Current protection of the transformer reverse sequenceLab.4. Generator protection against overcurrent and overloadLab.5. Maximum current protection of the induction motor**Relay protection of power systems:**Lab.1. Connection diagram of measuring current transformersLab.2. Overcurrent protection / cutoff of the two transmission lines with a single feedLab.3. The current directional protection of power lines in the ringLab.4. Breaker failure (circuit breaker failure protection)Lab.5. Distance protection of transmission lines in the dual feed network**Electrical Materials:**Lab.1. The study of ferroelectricsLab.2. Determination of the electrical characteristics of dielectricsLab.3. Research magnet soft materialsLab.4. Defining characteristics of semiconductors | Satisfactory.There are instructions when working on electrical installations and devices. Lightingandsafetymeetthestandards. Groundingset.Therearesafetymagazines. | 11 seats | 30,7sq.m. |
| **Lab.223MMC** | **Electronics and microcircuitry:**Lab.1. Design and management of the physical model of a gas turbine power plant. The survey gauges and PresentationLab.2. The study single-control systemLab.3. Setting the automatic control system regulator frequency of rotation of the electric generator.Lab.4. Evaluation of the quality control process. SelectingthetypeofcontrollerLab.5. Functional diagram of a gas turbine power plant automation | Satisfactory.There are instructions when working on electrical installations and devices. Lightingandsafetymeetthestandards. Groundingset.Therearesafetymagazines. | 12 seats | 20 sq.m. |
| **Lab. 16MMC** | **Information and measuring technology:**Lab.1. Checking technical ammeter magneto systemLab.2. Calibration of the system magneto-electric voltmeterLab.3. Verification wattmeter electrodynamic systemLab.4. Verification of single-phase electric power meters Induction SystemLab.5. Enhanced measurement limits ammeter**Electric cars:**Lab.1. Studies of single-phase and three-phase transformersLab.2. The research groups of the compounds of three-phase two-winding transformerLab.3. Investigation of the induction motor with squirrel cage and slip ringLab.4. The study of three-phase synchronous generator, parallel operation with the networkLab.5. The study of three-phase synchronous motor**Fundamentals of electrical safety:**Lab.1. Determination of the influence of the regime and its mains neutral on electrical conditionsLab.2. Determination of describing phenomena at the current runoff into the ground through the protective earthingLab.3. Full-scale simulation of vanishing electricalLab.4. Insulation monitoring in electric networks with isolated neutralLab.5. Resistance to earth**Power supply:**Lab.1. Research schemes include secondary windings of the current transformersLab.2. Research overcurrent protection using an induction current relayLab.3. Study modes AC power line when the load power factorLab.4. protection relay test down tranformatoraLab.5. protection relay test high-voltage motor | Satisfactory.There are instructions when working on electrical installations and devices. Lightingandsafetymeetthestandards. Groundingset.Therearesafetymagazines. | 20 seats | 60 sq.m. |
| **Lab.29 MMC** | **Power converters of energy:**Lab.1. Research uncontrolled rectifiersLab.2. The study controlled rectifiersLab.3. The study of the device operation and remove the pulse of the phase control system performanceLab.4. Study AC voltage regulatorsLab.5. Study pulse controllers DC**Electro mechanics and electrical equipment:**Lab.1. Introduction to electrical engineering and elektromehanotroniku. Generalized electromechanical transducer. Design and construction principles elektromehanotronnyh systemsLab.2. Electrical insulation and cable equipmentLab.3. Electro technological installations and systemsLab.4. Light and light sourcesLab.5. Electric drive and automation of technological complexes**The theory of the automated electric drive:**Lab.1. Investigation of DC motor.Lab.2. Investigation of the characteristics of an induction motor.Lab.3. Implementation of the typical elements of an induction motor control systems.Lab.4. Formation of load diagrams of engines on test bench.Lab.5. Investigation closed electric drive systems. | Satisfactory.There are instructions when working on electrical installations and devices. Lightingandsafetymeetthestandards. Groundingset.Therearesafetymagazines. | 12 seats | 20sq.m. |
| **Lab.29aMMC** | **Electric vehicles:**Lab.1. Research fusesLab.2. Research contactors AC and DCLab.3. Investigation electromagnetic relay timeLab.4. breaker ResearchLab.5. Research overcurrent relayS**witching devices, protection and management:**Lab.1. Research contactors AC and DCLab.2. Research overcurrent relays.Lab.3. Removing the time current characteristics of the automatic air circuit breaker.Lab.4. Removing the time current characteristics of the fuse. Determination of error of current and voltage transformersLab.5. Removing the time current characteristic electrothermal relays.Lab.6. Removing IDMT the installation of electromechanical timer. | Satisfactory.There are instructions when working on electrical installations and devices. Lightingandsafetymeetthestandards. Groundingset.Therearesafetymagazines. | 20 seats | 62,2 sq.m.  |
| **Lab.50aMMC** | **Theory of automated electric. Automatic electricity system.**Lab 1 - Programming sequential chain. Develop a simple Grafcet.Lab-2 -Structured, Grafcet (cycle). Building fronts (Trigger).Lab-3 -Programming stroke and stop automatically.Lab-4 -Programming stroke and stop manually. Initialization of the initial position.Lab 5 -Emergency stop. Hot restore (import, export sections).Lab 6 - Working with function blocks.Lab-7 -Create arbitrary function blocks. Additionalfeaturescarrier-screen. | 12 laptops with programmable logic controllers M340on modular training stands 16 inputs / 16 outputs, electrical facilities management "surface treatment", electro-object control "rotating arm" stand "workshop fault detection" for the study of the characteristics of the sensor, stand "produktis" (conveyor for filling vials)for the study of the control and man-machine dialogue 2 subsystem "produktis" for packaging and corking bottles under the control of the programmable controller. | 12 seats | 95sq.m. |
| **Lab.173MMC** | **Electricity, Electro mechanics and electrical equipment, Electrical Power, Electricity supply companies, Relay protection of power systems, relay protection of electrical equipment, Electrical Fundamentals, Safety in electrical installations.**Stand the engine is started, the selective protection Stand, Stand Mode neutrals, Booth encoder Stand Research harmonics Stand main cabinet of low voltage, engine start-up Stand, Stand ATV 31, ATV 71 Stand, Stand Research harmonics. Module 1: Lab -1 - Study of power circuits and control circuits Lab -2 - Practical study selectivity tuning Lab - 3 - Practical study razhima TT and TN Lab - 4 - Evaluation of positioning performance Lab -5 - Study of linear and non-linear loads - 4 hours Lab - 6 - The study of electrical circuits and commissioning.2 module: Lab - 1 - Ways to Start an asynchronous dvitelya with KZ rotor. Lab - 2 - Frequency - regulated electric drive on the basis of the frequency converter ATV 31. Lab - 3 - frequency - regulated electric drive on the basis of the frequency converter ATV 71. Lab - 4 - Qualitative study of electromagnetic compatibility. Lab - 5 - Control of the main cabinet of low voltage via the Modbus network and UPS studies. | Satisfactory.There are instructions when working on electrical installations and devices. Lightingandsafetymeetthestandards. Groundingset.Therearesafetymagazines. | 12 seats | 100sq.m. |
| **Lab.173bMMC** | **Learning Lab "Installation and design of electronic circuits."**Laboratory stands 12 workplaces equipped with the standard grids and transformer for the control circuitUsed parts: rails, wiring ducts, wires, terminals, switches, fuses, contactors, thermal relays, terminals, control buttons ...Standard insulated tools and production tools for stripping wires, crimping ..., Training engines for testing electronic circuits, Personal protective equipment: helmet with a shield, gloves, insulating carpet ..., Voltmeters, and checking the absence of voltage tester to check for an open circuit | Satisfactory.There are instructions when working on electrical installations and devices. Lightingandsafetymeetthestandards. Groundingset.Therearesafetymagazines. | 12 seats | 95 sq.m. |
| **Lab.48 MMC** | **Automatic Control in Power Engineering 2**12 Laptop Programmable Logic PLC controllers (PLC),Language of Unity Pro programming language LADDER Programming, Programming inFunction blocks FBD, Instruction List IL, SFC Sequential Function Chart.Lab - the vertical position of programming hoist.Lab - Simulation of the swimming pool pump. Programming in FBD language. Programming in IL Instruction List Programming Structured Text (STRUCTURED TEXT). Simulationwork 3 pumps. | Satisfactory.There are instructions when working on electrical installations and devices. Lightingandsafetymeetthestandards. Groundingset.Therearesafetymagazines. | 12 seats | 64,sq.m. |
| **Lab. 267MMC** | Stand "Review of explosion-proof equipment," Stand "Explosion-proof control and display positions" Stand "Explosion-proof fittings and cable glands" Stand "Explosion-proof power distribution cabinets," Stand "Explosion-proof light fittings," Stand "Explosion-proof displays, computers, terminals, display , network equipment, video surveillance, "Stand" Explosion-proof light and sound alarm devices and display "Stand" Box terminal connection Explosion-proof "Stand" Explosion-start motor control system, "Stand" Explosion system frequency regulation electric "Stand" Explosion control system obstacle lights with battery-buffered "Stand" Explosion control and display positions "Stand" Explosion-proof battery system buffered devices " | Satisfactory.There are instructions when working on electrical installations and devices. Lightingandsafetymeetthestandards. Groundingset.Therearesafetymagazines. | 20 seats | 62,2 sq.m. |
| **Lab.147MMC** | **Theory of Electrical Engineering 1:**Lab.1. Research DC circuitsLab.2. The principle of superposition in linear chainsLab.3. Equivalent transformations of complex linear circuitsLab.4. Study of the simplest circuits sinusoidal currentLab.5. Series connection of passive circuit elements sinusoidal current | State Cabinet satisfactory.All computers in working condition, connected to the Internet.Lighting OK. Grounding set.There are safety magazines. | 12 seats | 30 sq.m. |
| **Lab.151MMC** | **Theory of Electrical Engineering 2:**Lab.1. Research inductance circuitsLab.2. Research non-sinusoidal current circuitsLab.3. The study of two-line optionsLab.4. LowpassfiltersLab.5.Filtry treble | Satisfactory.There are instructions when working on electrical installations and devices. Lightingandsafetymeetthestandards. Groundingset.Therearesafetymagazines. | 8 seats | 30 sq.m. |
| **Lab.914 GAM** | **Physics 2:**Lab.1. Determination of the horizontal component of the Earth magnetic field.Lab.2. Removal of the hysteresis loop.Lab.3. The study of forced oscillations in the oscillatory circuit.Lab.4. Determination of the coefficient of mutual induction.Lab.5. The study centered optical systems. | Grounding set.The level of equipment is good laboratory equipment. There are safety magazines.Updates: 2006, 2007 - 2 laboratory complex "Vladis" (Moscow Engineering Physics Institute, Russia);2008 4-Phywe (Germany) company laboratory facilities.Laboratory to certify, premises meet sanitary standards and safety | 6 seats | 25 sq.m. |
| **Lab.913 GAM** **916 GAM**  | **Physics 1:**Lab.1. The mathematical processing of the results of measurement of physical quantities. The study of the laws of kinematics and dynamics of translational motion.Lab.2. The study of the elastic and inelastic collision of bodies. Determination of the moment of inertia of the flywheel.Lab.3. Determination of the gravitational acceleration using a mathematical pendulum. Determining the length of the sound waves by standing waves.Lab.4. Determination of the gravitational acceleration using physical, revolving pendulum. DeterminationoftheadiabaticindexbyClementandDesormes.Lab.5. Determination of liquid surface tension coefficient of account drops. Thestudyofelectrostaticfield. | 50 seats | 90 sq.m. |
| **Lab.925 GAM**  | **Applied Physics:**Lab.1. Analytical verification of the laws of kinematics and dynamics of translational motionLab.2. The study of the laws of conservation of momentum and energy for example balls collisionLab.3. Defining the inert properties of the rotating body, the analytical verification of the basic law of dynamics of rotational motionLab.4. Determination of the coefficient of internal friction of liquid falling ball method (Stokes method)Lab.5. Determination of the specific heat of gas | 32 seats28 seats | 130sq.m.90 sq.m. |
| **Lab.113GAM**  | **Mechanics:**Lab.1. The tensile test. Compression Testing ductile, brittle and anisotropic materials.Lab.2. Determination of modulus of elasticity and Poisson's ratio.Lab.3. Test cut steel and wood chipping samples. Torsional Testing of different materials.Lab.4. A study of the law of distribution of normal stresses in lateral bending.Lab.5. Test steel coil spring. Test on the stability of a straight rod. | The level of equipment is good laboratory equipment. Laboratory to certify, premises meet sanitary standards and safety. Therearesafetymagazines. | 24 seats | 54 sq.m. |
| **Lab. 53MMC** | **Occupational Safety and Health:**Lab.1 First aid in case of accident.Lab.2 Determination of harmful gas (vapor) in the air of industrial premises.Lab.3 Determination industrial premises microclimate parameters.Lab.4 Research and calculation of industrial noise on the premises.Lab.5 Research and calculation of natural lighting.Lab.6 Research and calculation of grounding devices parameters. Means of extinguishing fires in an active way. | The level of equipment is good laboratory equipment. Laboratory to certify, premises meet sanitary standards and safety.There are safety magazines. | 16 seats | 36 sq.m. |
| **Lab. 243MMC** | **Life Safety Fundamentals:**Lab.1. Devices radiation, chemical detection and radiation monitoring. Assessment of radiation situation.Lab.2. Prediction scale infection of highly potent toxic substances in case of accidents (destruction) on chemically hazardous objects and transport.Lab.3. Determination of stability of economic facilities in emergency situations. Evaluation of engineering protection of workers and employees of facilities management.Lab.4. Defining areas of emergency situations of natural and technogenic character. Providingpre-hospitalcare.Lab.5. Evaluation of engineering, fire and medical conditions in the earthquake. | State lab satisfactory. There are instructions when working on electrical installations and devices. Lighting and safety meet the standards. Grounding set.There are safety magazines. | 30 seats | 187,2 sq.m. |