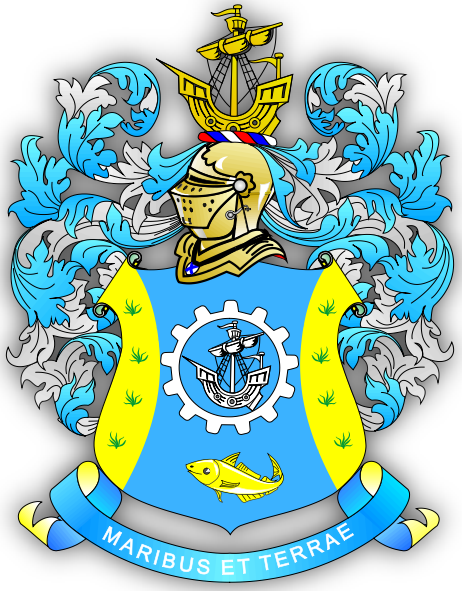

Russian Federation

Federal Fishery Agency

Federal State Government-financed Educational Institution of Higher Professional Education

KALININGRAD STATE TECHNICAL UNIVERSITY

(FSGEI HPE “KSTU”)

Themes in the BSc / specialists modules – module “Electrical energy supply systems”

1. **Authors**: Doctor of Technical Science, Professor Valeriy Beley – The Head of Electrical Equipment of Ships and Electrical Power Engineering Department KSTU, vbeley@klgtu.ru;

   Specialist in Electrical power systems and grids, Dr-Ing Andrey Nikishin, associate professor in the same department, Andrey.Nikishin@outlook.com.

2. **Field of specialists education**:

   140400 “Electrical Power Engineering and Electrictrotechnic”. Profile: “Electrical Power Engineering”. Qualification: “BSc”.

3. **The demand in Kaliningrad region:**

   The demand of specialists is about 60 people each year. The objects of professional activity: JSCo “Yantarenergo”; Thermal Power Plant – 2, electrical and technical organizations, electrical-design companies.

4. **Target of the module** is to develop knowledge in basic electricity supply of urban, industrial and transportation systems for specialist for energy and environmentally sustainable, affordable and healthy building policy.

5. **The program module:**

   The workload of the module - 6 credits. Education 5-6 semesters.

   The main topics of the module:

   1. Special considerations of cities, industries and transport electrical power supply;
   2. Consumption of electrical energy and electrical loads;
   3. Connection schemes of power supply systems to supply networks;
   4. Connection schemes and design of the main, and the step-down distribution substations;
   5. The elements of power supply systems selection and calculation;
   6. Power quality and it’s guarantee;
   7. Compensation of reactive power;
   8. Electrical safety practices. Different types of earthing systems, the grounding device.

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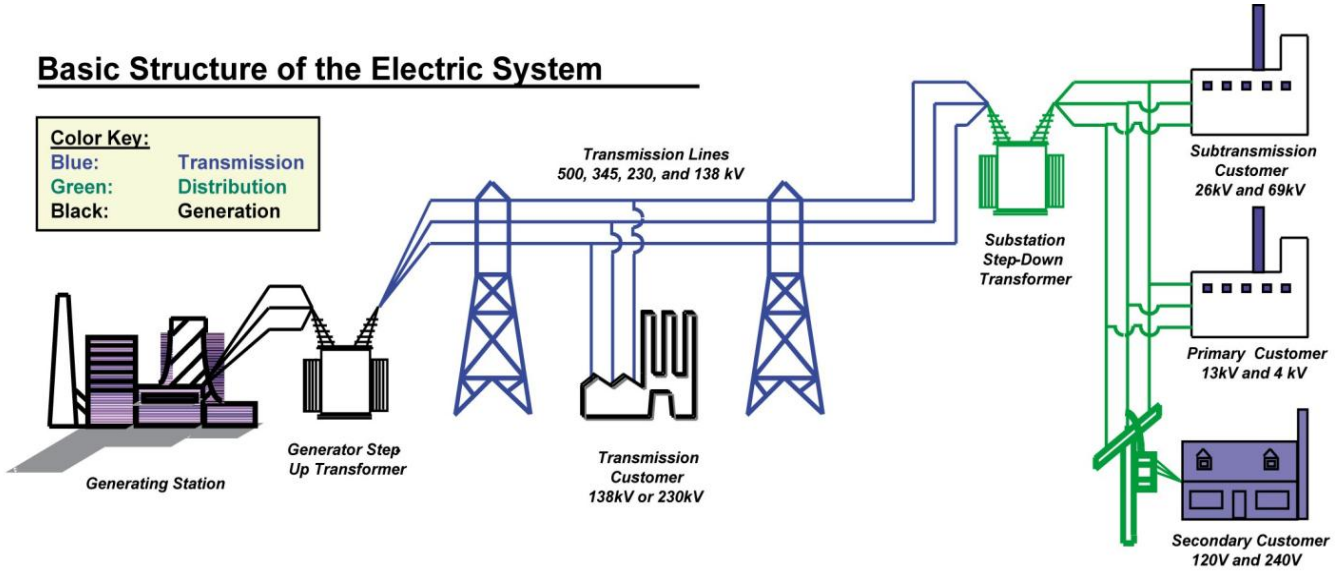
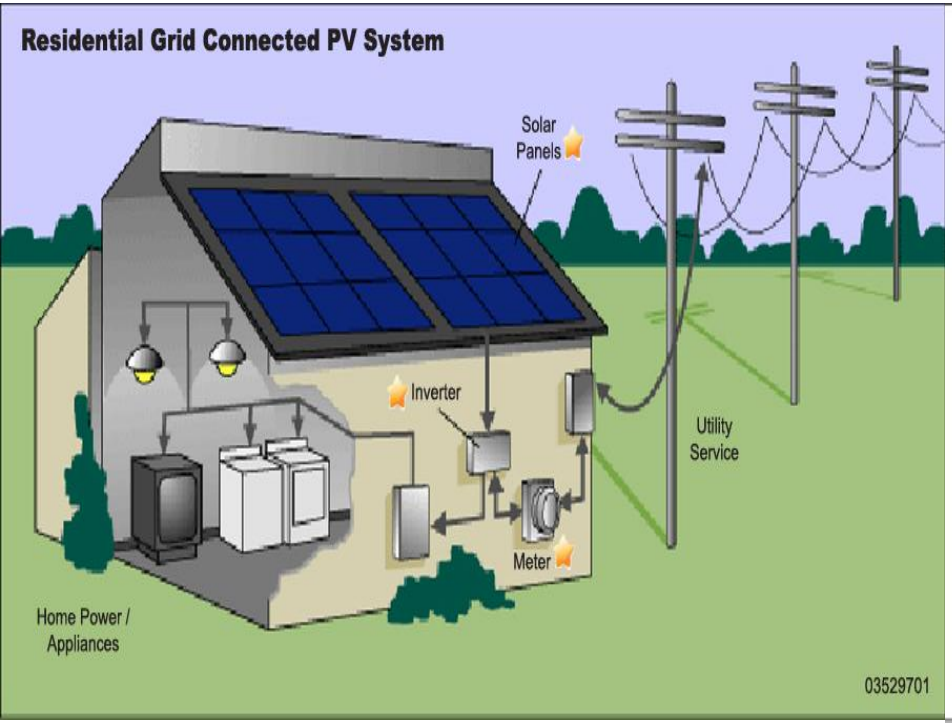
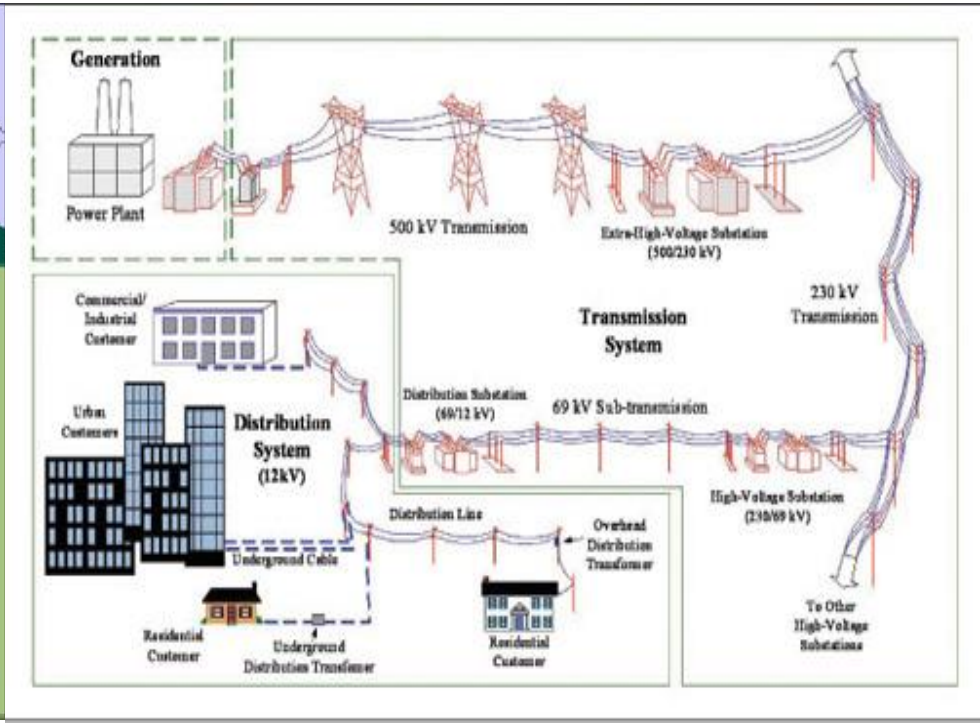

Basic Structure of the Electric System
Color Key:
Blue: Transmission
Green: Distribution
Black: Generation
Transmission Lines
500, 345, 230, and 138 kV
Substation
Step-Down
Transformer
Subtransmission
Customer
26kV and 69kV
Primary Customer
13kV and 4 kV
Generating Station
Generator Step
Up Transformer
Transmission
Customer
138kV or 230kV
Secondary Customer
120V and 240V


Residential Grid Connected PV System
Solar
Panels
Inverter
Utility
Service
Meter
Home Power /
Appliances
03529701


Generation
Power Plant
500 kV Transmission
Extra-High-Voltage Substation
(500/230 kV)
230 kV
Transmission
Transmission
System
Commercial/
Industrial
Customer
Urban
Customers
Distribution
System
(12kV)
Distribution Substation
(69/12 kV)
69 kV Sub-transmission
High-Voltage Substation
(230/69 kV)
Distribution Line
Overhead
Distribution
Transformer
Underground Cable
Residential
Customer
Underground
Distribution Transformer
Residential
Customer
To Other
High-Voltage
Substations

Main literature on the basis of which the module will be developed

- **Materials of work performed in the framework of international educational projects.**
  1. Valeriy Beley. The introduction of green energy: Technical and ecological problems of a wind power / Valeriy Beley / / Implovement of Environmental Education at kaliningrad State Technical University. -2005 - P. 124-127. TEMPUS «FORESEE: Formation of Russian Expertise to Skill in Environmental Education» (No. CD_JEP-22192001) contractor University of Kalmar (Sweden), 2001-2005
- **Fundamental international labor.**
  1. Power System Harmonics, 2nd Edition, Jos Arrillaga, Neville R. Watson ISBN: 978-0-470-85129-6, 412 pages, October 2003.
  2. Transmission and Distribution Electrical Engineering, Fourth Edition, 1180 pages, Publisher: Newnes; 4 edition (February 14, 2012).
- **Seminal work, published in the Russian Federation.**
  1. Kudrin, BI Power industry: studies. for schools / B.I. Kudrin. - Moscow: Intermetinzhiniring, 2005. - 520 p.
  2. Fedorov, A. Fundamentals of electricity industry: studies. for schools / A.A. Fedorov, V. Kamenev. - 3rd ed. Rev. And add. - Moscow: Energiya, 1979. - 408 p.
  3. Kozlov V.A. Power supply cities, 2nd ed., Rev. Moscow: Energiya, 1977. - 280 p.: Ill.
- **Proceedings of the authors on the subject of the module.**
  1. Beley Valeriy. Quality of the electric power in electrical distribution networks / Summary of the series of lectures for students study "Renewable energy sources" course: Textbook -. FH Stralzund, 2010, - P. 49.
  2. Beley V.F. On some problems concerning the electromagnetic conpatibility of the control systems of units compencating reactive power. / / Intenational sympoium on elektromagnetic compatibility, May 16-20.1994.Sendai., Japan - P.271-273.
  3. Beley V.F. Maintence of overall performance of country electrical networks / / Rozwoj teorii I technologi w technicznej modernizacji rolnictwa: 3 Miedzynarodowa konferencja naukowa, Olstyn, 2000. - P. 21-26.
  4. Belay V.F. Assessing the role of transformers in energy supply from the standpoint of energy saving and power quality / V.F. Belay / Industrial Energy. - 2002. - № 5. - S. 36-42. (Impact Factor: Vol. - 63, p. 1412, IF author)
  5. Belay V.F. Some compatibility problems bioelectromagnetic electrical systems and systems / V.F. Belay / / Life Safety. - Moscow: Publishing House "New Technology". - 2010 - № 3. - P.19-22.
  (Impact Factor: Vol. - 124, p. 727, author IF 0.156)
  6. Belay V.F. Reliability analysis of the power system of the Kaliningrad region and the security of supply of regional consumers / V.F. Beley / / Life Safety. -2013 - № 1. - P.16-20. (Impact Factor: Vol. - 124, p. 727, author IF 0.156)
  7. Belay V.F. Wind power in Russia: analysis of scientific, technical and legal issues / V.F. Belay, A. Nikishin / / Elektrichestvo.-2011. - № 7. - From 7-14.
  (Impact Factor: Vol. - 230, p. 3082, author IF 0.286)

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Themes in the BSc / specialists modules (programs) – module “Energy efficiency in engineering systems”

1. **Authors:** Doctor of Technical Sciences, Professor Anatoliy Gerasimov - The Head of Heat and Gas Supply KSTU, aager_kstu@mail.ru; PhD Igor Alexandrov - Associate Professor in the same department.
2. **Direction of education of specialists:**

   270800 “Civil Engineering". Profile: "Heat and Gas Supply“. Qualification: "Bachelor.“
3. **The demand in the Kaliningrad region**.
   According to preliminary data, the need of about 40 people per year. The objects of professional activity: design and construction organizations, operating service companies and organizations; heat supply and gas supply companies; housing facilities.
4. **Target of the program** is to develop knowledge of scientific bases of energy in heating, ventilation and air conditioning and skills development of energy-efficient HVC systems in buildings for various purposes.
5. **The workload of the program** - 5 credits. Education in 8 semesters.

   The main sections of the program:

   5.1. Thermodynamic and energy basics
   5.2. Alternative and renewable energy sources for HVC
   5.3. Transmitters for HVC heat
   5.4. Energy-efficient heating system
   5.5. Energy-efficient HVC system
   5.6. Energy-efficient buildings

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Main literature on the basis of which the module will be developed

- **Materials of work performed in the framework of international educational projects.**
  1. Valeriy Beley. The introduction of green energy: Technical and ecological problems of a wind power / Valeriy Beley / / Implovement of Environmental Education at Kaliningrad State Technical University. -2005 - P. 124-127. TEMPUS «FORESEE: Formation of Russian Expertise to Skill in Environmental Education» (No. CD_JEP-22192001) contractor University of Kalmar (Sweden), 2001-2005
- **Fundamental international labor**
  1. Gopal N. T. Advanced Renewable Energy Sources / N.T Gopal. R.K.Mishra. - 2011. - 584 p. (ISBN: 978-1-84973-380-9)
  2. Brian C. B. Alternative Energy / C.B. Brian, R. Flarend. - ABC-CLIO, 2010, 222p.
- **Seminal work, published in the Russian Federation.**
  1. Practical guide to the selection and development of energy-saving projects / Ed. OL Daniel, PA Kostyuchenko. - CJSC "Tehnopromstroy", 2006. - 668 p. 2. Fedorov, 2. Fokin V.M. Fundamentals of energy conservation and energy audits / V.M. Fokin. - M.: "Publisher Engineering-1", 2006. - 256.
  3. Andrizhievsky A.A. Energy Saving and Energy Management: A Training Manual, 2nd ed. fixed. - Mn.: Your. wk., 2005.- 294 p.
  4. Energy savings in power and thermotehnologiyah: a textbook for students enrolled in the direction of preparation "Thermal" / O.L. Daniel [etc.], ed. A.V. Klimenko. - 2nd ed., Sr. - Moscow: MEI, 2011. - 424 p.
- **The author's work over the past three years, similar to the theme of the program**
  1. B.A. Grigoriev The fundamental equation of state of hydrocarbons in the critical / B.A. Grigoryev, A.A. Gerasimov, E.B. Grigoriev / / Defense complex scientific and technical progress of Russia. - 2010. - № 3. - S. 52-60. (IF 0.214 author)
  2. A.A. Gerasimov Thermal properties of n-alkanes C5 - C13 in the temperature range from the triple point to the critical / A.A. Gerasimov, I.S. Alexandrov, B.A. Grigoriev, E.B. Grigoriev, / / defense complex - the scientific and technological progress in Russia. - 2011. - №. 1. - S. 43-57. (IF 0.214 author)
  3. Alexandrov IS Application of the fundamental equations of state for calculating the thermodynamic properties of the normal undecane / IS Aleksandrov, AA Gerasimov, BA Grigoriev / / Thermal. - 2011. - № 8. - S. 67-74. (IF 0.343 author)
  4. B.A. Grigoriev The fundamental equation of state of n-dodecane and n-tridecane / BA Grigoryev, AA Gerasimov, IS Aleksandrov / / Proceedings of the State Oil and Gas named after Gubkin. - 2012. - № 2 (267). - P.101-119.
  5. Alexandrov I.S. The fundamental equation of state of-m-p-xylene / I.S. Aleksandrov, A.A. Gerasimov, B.A. Grigoriev / / defense complex - the scientific and technological progress in Russia. - 2012. - № 1. - S. 48-62. (IF 0.214 author)

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Topics recommended for modules (programs) Bachelors and Masters: "Renewable Energy Sources" (Recommended Introduction to the "Renewable Energy Sources")

KSTU proposal is to develop one section “Wind Power” for this module.

1.Authors: Doctor of Technical Science, Professor Valeriy Beley – The Head of Electrical Equipment of Ships and Electrical Power Engineering Department KSTU, vbeley@klgtu.ru; Specialist in Electrical power systems and grids, Dr-Ing Andrey Nikishin, associate professor in the same department, Andrey.Nikishin@outlook.com.

Valeriy Beley published 40 projects in “Wind Power”, including:

Valeriy Beley Wind power in Russia: analysis of scientific, technical and legal problems / V.F. Belay, A. Nikishin / / Elektrichestvo.-2011. - № 7. - From 7-14 **(Impact Factor: Vol. - 230, p. 3082, IF 0.286).**

Prof. Beley participated in **International Project 2005/214 "Perspectives of offshore wind energy development in marine areas of Lithuania, Poland and Russia. (POWER)»**

The first official opponent report on the thesis of Nikolaev V.G. for the degree of doctor of technical sciences, scientific specialty "05.14.08 Power plants based on renewable energy" on theme: "Methodology of the resource and technical and economic justification of wind power plants.“

Andrey Nikishin thesis for the degree of candidate of technical sciences, scientific specialty 05.09.03 - Electrical complexes and systems, on theme: "Mathematical models of offshore wind turbines with asynchronous machines“

National Russian Olympiad. DIPLOMA RF 3rd degree.

Zadorozhnyj S.A. "Design of the electrical part of offshore wind power capacity of 130 MW"

Themes of modules (programs) Masters: Strategic of power consumption in the regional electrical complexes (Recommended – Strategic facilities management)

1. **Author:** Professor, Doctor of Science, Specialist in Electrical power consumption and energy saving – Viktor Gnatyuk, KSTU, gnatukvi@mail.ru.
2. **Direction of education of specialists:**

   140400 "Electric Power and Electrical Engineering". Profile: "Electric Power". Qualification: "Master".
3. **The demand in the Kaliningrad region**.

   According to preliminary data, the need is 10 - 15 professionals annually. The objects of professional activity: organs control of the regional government and municipalities; JSCo "Yantarenergo"; Thermal Power Plant – 2, electro-technical services companies; organizations and etc.
4. **The targets of the module:**

   Target of the program is to develop knowledge about basic strategic control of a power consumption in the regional, municipal, industrial and corporate electrical complexes.
5. **Programs of module:**

   Labor content - 5 credits, training - in 3rd semesters.
6. **The main topics of the module:**

6.1. The modern concept of technology, technocenoses and technological reality. 6.2. Fundamental technocenoses level analysis. 6.3. Modern regional electric energy complexes. 6.4. The structure and composition of the regional electrical complex. 6.5. Methodology of strategic management of power consumption. 6.6. Interval estimation procedures, forecasting and valuation. 6.7. Potential definition and dynamic modeling. 6.8. Evaluating the effectiveness of the strategic management of power consumption.

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Main literature on the basis of which the module will be developed

1. Victor Gnatyuk Law optimal construction technocenoses / V.I. Hnatiuk. - Issue 29. Tsenologicheskie study. - Moscow: Publishing House of the Tbilisi State University - Center for Systems Research, 2005. - 384 p.

2. Victor Gnatyuk Optimal control of the regional electrical power consumption of the complex (technocenosis): The economic problems of the energy complex / V.I. Hnatiuk. - Moscow: Publishing House of the Institute of Economic Forecasting, 2006. - 147 p.

3. Victor Gnatyuk Forecasting regional electricity electrical complex on the inertia phase of development: The economic problems of the energy complex / V.I. Hnatiuk, D.V. Lutsenko. - Moscow: Publishing House of the Institute of Economic Forecasting, 2009. - 92 p.

4. Victor Gnatyuk Prediction of power consumption based on GZ-analysis / V. Hnatiuk, D.V. Lutsenko. - Kaliningrad: Publishing House of the CRPD, 2010. - 144 p.

5. Victor Gnatyuk Philosophical foundations tehnotsenologicheskogo approach / V. Gnatyuk.-Kaliningrad: Publishing House of the CRPD, 2010.-284 p.

6 Victor Gnatyuk Rationing of electricity facilities regional electrical complex with limiting algorithm / V.I. Hnatiuk [et al.] - Kaliningrad: Publishing House of the CRPD, 2012. - 289 p.

7. Modeling systems: a tutorial / Victor Gnatyuk [et al.] - Kaliningrad: Publishing House of the CRPD, 2009. - 650 p.

8. Technique, technosphere, energy saving [Site] / Victor Gnatyuk - Electronic text data. - M.: [BI], [2000 - 2013]. - Mode of access: http://www.gnatukvi.ru.

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Topics recommended for modules (programs) PhD:
MODULE: Intelligent and biometric systems

1. **Author:** Doc.-Ing. Specialist in electrical automation systems, electrical power system automatic protection systems – Victor Ovchinnikov, Vixovchinnikov@mail.ru.
2. **Direction of education of specialists**:

   551700 – Electric Power. Degree (qualification) - Master of Engineering and Technology.
3. **The demand in the Kaliningrad region.**

   According to preliminary data, the need of about 10 professionals. The objects of professional activity: OAS "Yantarenergo"; Thermal Power Plant – 2; banks; government institutions; universities; hospitals; schools and other development organizations.
4. **Target of the program** is to research and development biometric technologies in various parts of human activity (production, science, medicine, education, the economy, etc.)
5. **The program module.**

   The complexity of the module - 4 credit units. Second year of study.

The main topics of the module:

1. Biometric of automated access control.
2. Biometric technology the integrated delivery of security of the country.
3. Biometric technology in medical facilities.
4. Biometric technology in education.
5. Biometric technology in housing.
6. Voice biometrics.
7. System "smart house".
8. Software provide biometric systems.

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Main literature on the basis of which the module will be developed

1.Tatarchenko NV, Timoshenko S. Biometric identification in integrated security systems / / Special vehicle. 2002.

2.Gintse A. New technology in access control / / Security Systems, 2005.

3.Maschenov RG Alarm systems: basic theory and principles of construction: a manual. M. Hotline - Telecom, 2004

4.Tihonov In A. Reich V. Security: conceptual, legal, organizational and technical aspects: Ouch. allowance. M.: Helios ART, 2006.

5.Kompleksnye security. Catalog. Moscow Research and Production Center "NELK" 2001.

6.Predtechensky V.I. Ryzhukhin Dmitry Sergeev, MS Analysis of the possibilities of using kodonabornyh devices (keyboards) in control and access control high security. M. MGIFI, 2005.

7. V. Ovchinnikov Energy-saving technologies in lighting systems. / / Proceedings of the KSTU "Electrical equipment of ships and power" 2001. - S. 67-71.

8. V. Ovchinnikov, Vladimir Ovchinnikov Laboratory workshop of Electrical and Electronics Engineers on a PC. / / Proceedings of the KSTU "Electrical equipment of ships and power" 2000. - Pp. 19-21.

9. V. Ovchinnikov ANNOTATED report for the 2004-2012 years. on "Development and implementation of the educational process computer systems training" Reg. № 43.45.200.2

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