

The Entrance Examination Program for admission to doctoral studies was reviewed and approved at the meeting of the Department of Power Engineering.
Minutes No. 8 dated "28" 04 2026.

Acting Head of the Department  **G.P. Kalimbetov**

The Entrance Examination Program for admission to doctoral studies was reviewed and recommended by the Council of the Institute of Power Engineering and Digital Technologies.
Minutes No. 9 dated "30" 04 2026.

Chairperson of the Institute Council  **A.Zh. Toigozhinova**

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1. PURPOSE OF THE ENTRANCE EXAMINATION

The purpose of the entrance examination is to assess the applicant's level of theoretical and practical preparation, as well as to determine whether the applicant's knowledge, skills, and competencies meet the requirements of the selected field of doctoral study.

The entrance examination for admission to the Doctor of Philosophy (PhD) program consists of the following components:

1. An interview conducted by the Examination Committee;
2. Responses to examination questions corresponding to the profile of the educational program group;
3. Submission of a letter of recommendation from an enterprise or organization.

2. FORMAT AND REGULATIONS OF THE ENTRANCE EXAMINATION

The total duration of the entrance examination is 2 hours and 30 minutes. During this time, the applicant completes an interview and answers an electronic examination ticket consisting of three questions.

The examination questions and electronic examination tickets are generated using a random selection procedure.

The maximum score for the entrance examination is 80 points, including: Profile examination corresponding to the educational program group – 50 points; Interview – 30 points.

3. ASSESSMENT TYPES AND EVALUATION CRITERIA

3.1 Evaluation Criteria for Responses to Electronic Examination Ticket Questions

The profile examination consists of three sections (blocks) designed to assess different competencies of the applicant:

- Question 1 – assesses the level and systematic nature of theoretical knowledge;
- Question 2 – assesses the level of functional (professional) competencies;
- Question 3 – assesses the level of systemic competencies and the ability to integrate professional knowledge. The maximum score for the profile examination is 50 points.

The electronic examination ticket consists of three questions:

Question	Assessment Focus	Maximum Score
Question 1	Theoretical question assessing the level and systematic nature of theoretical knowledge	10
Question 2	Practical question assessing functional competencies, including the ability to apply methods, technologies, and professional approaches within the subject area	20
Question 3	Question assessing systemic competencies, comprehensive understanding of the subject area, and specialized knowledge of research methodology	20
Total		50

Evaluation Criteria for Responses to Electronic Examination Ticket Questions

Question	Evaluation Criteria	Score
Question 1	Demonstrates knowledge of the fundamental processes within the subject area and provides a comprehensive and well-structured answer	5
	Presents ideas logically, consistently, and with appropriate justification	3
	Demonstrates correct use of professional terminology and conceptual framework	2
	Subtotal	10
Question 2	Applies appropriate methods, techniques, and technologies to solve professional problems within the subject area	7
	Analyzes, compares, classifies, and justifies professional decisions; summarizes findings based on practical skills	7
	Effectively analyzes information obtained from various sources	6
	Subtotal	20
Question 3	Critically analyzes and evaluates theoretical and practical developments, scientific concepts, and current trends in the development of the discipline	7
	Integrates methodological approaches in explaining key issues within the subject area	7
	Identifies cause-and-effect relationships when analyzing processes, phenomena, and events	6
	Subtotal	20
	TOTAL SCORE	50

3.2 Interview Evaluation Criteria

No.	Assessment Criteria	Descriptors	Score
1	Motivation	Demonstrates a clear rationale for pursuing doctoral studies in the selected educational program and choosing the university. Explains professional and personal development goals after completing the doctoral program.	5
2	Research Competence	Demonstrates research skills, analytical thinking, and the ability to conduct scientific research within the relevant field of study. Shows understanding of scientific methodology and research approaches.	10
3	Creativity and Critical Thinking	Demonstrates creative thinking, the ability to generate original ideas, and to propose alternative solutions to scientific and engineering problems.	10
4	Communication Skills	Expresses ideas clearly, logically, and convincingly. Demonstrates the ability to formulate conclusions, defend personal viewpoints, and communicate effectively. Demonstrates proficiency in foreign languages where applicable.	5
	Maximum Score		30

3.3 Letter of Recommendation from an Enterprise or Organization

Applicants to the **Professional Doctoral Program** shall submit a **Letter of Recommendation** issued by an enterprise or organization.

The letter must be prepared on the official letterhead of the enterprise (organization), signed by an authorized official, and certified with the organization's seal (where applicable).

The Letter of Recommendation should confirm the applicant's professional qualifications, work experience, and the organization's interest in the applicant's doctoral studies and subsequent professional activities. The document may also include information on the applicant's professional achievements, leadership potential, and prospects for applying the research results in industry.

4. EXAMINATION CONTENT

4.1 Content of the Entrance Examination

The entrance examination materials for the Educational Program Group, as well as the profile examination questions, are developed in three languages: Kazakh, Russian, and English.

The examination questions are based on selected sections of the core disciplines included in the curriculum of the Educational Program 8D07168 – Electrical Power Engineering (Professional Track).

No.	Course Title
1	Electrical Power Networks and Systems
2	Power Plants and Substations
3	Relay Protection and Automation in Electric Power Systems

4.2 Content of the Examination Topics by Blocks

Block 1

Content:

Structures of electric power transmission lines. Characteristics and parameters of electric power system components. Operating conditions of electric power systems. Electromechanical systems of electrical apparatus. Heating and cooling processes of electrical apparatus. Switching processes in electrical circuits. Electrodynamics forces in electrical apparatus. Electrical contacts. Low-voltage and high-voltage switchgear equipment. Direct current (DC) and alternating current (AC) electrical machines. High-voltage insulation. Overvoltages and methods of protection against them.

Block 2

Content:

Indoor switchgear (GIS/Indoor Switchgear). Outdoor switchgear (Outdoor Switchgear). Storage batteries. Materials used in electrical machine manufacturing. Transformer construction: magnetic core, windings, oil-filled transformer tank, and tank accessories. Operating principle of power transformers. Autotransformers: comparison between autotransformers and conventional transformers. Electric arc. Low-voltage electrical apparatus.

Block 3

Content:

Purpose of relay protection and automation in power supply systems. Components of relay protection and automation devices. Operating principle of automatic reclosing (AR). Operating principle of automatic transfer switch (ATS). Protection and automation of power plants,

substations, and electricity consumers. Protection and automation of transmission lines. Directional overcurrent protection. Distance protection. Differential current protection. Reliability of power plants and substations. Reliability of transmission lines.

4.3 Interview Questions

1. What motivated you to pursue doctoral studies in Electrical Power Engineering?
2. What are your long-term academic, research, and professional goals after obtaining a PhD degree?
3. Why did you choose our university and this particular educational program for your doctoral studies?
4. Which current scientific or engineering challenges in the field of electrical power engineering do you consider the most significant, and why?
5. How do you expect your future doctoral research to contribute to the advancement of electrical power engineering in science, industry, or society?
6. What knowledge, professional experience, and personal qualities can you contribute to the academic and research community of our university?
7. Describe your most significant research project, engineering project, or academic work. What were its objectives, research methods, key findings, and your personal contribution?
8. What were the major challenges you encountered during your previous research or professional project, and how did you overcome them?
9. Which engineering software packages, simulation tools, data analysis methods, or experimental techniques have you used in your previous work (e.g., MATLAB/Simulink, DlgSILENT PowerFactory, ETAP, PSCAD, EMTP-RV, Python, SCADA systems, or laboratory equipment)?
10. Do you have experience publishing scientific papers or presenting research at academic conferences? If so, please describe your experience. If not, how do you plan to develop these research competencies during your doctoral studies?
11. Describe your experience in working with scientific literature. Which academic databases and information resources do you use to search for, analyze, and critically evaluate scientific publications?
12. What is your preliminary vision of your doctoral research topic? Please describe the proposed research objectives, research tasks, research object, subject, and working hypothesis.
13. In your opinion, what will constitute the scientific novelty and practical significance of your proposed doctoral research?
14. What do you consider to be the most critical challenges facing the modern electric power industry (e.g., power systems, distribution networks, electricity markets, Smart Grids, renewable energy integration, digitalization, cybersecurity, decarbonization, or energy storage technologies)?
15. Which personal qualities, professional competencies, and research skills will help you successfully complete a PhD program? Which competencies would you like to further develop during your doctoral studies?

5. RECOMMENDED REFERENCES

5.1 Main References

1. Abdullayev, M.Sh. Electric Power Systems and Networks: Textbook. – Almaty: Evero Publishing House, 2021.
2. Kudrin, B.I. Power Supply Systems: Textbook for Higher Education Institutions. – Moscow: Academy Publishing Center, 2020.

3. Fedorov, A.A., Kameneva, V.V. Power Plants and Substations: Study Guide. – Moscow: Academy Publishing Center, 2019.
4. Chernobrovov, N.V., Semenov, V.A. Relay Protection of Electric Power Systems: Textbook for Higher Education Institutions. – Moscow: Energoatomizdat, latest edition.
5. Kim, K.K., Badertdinov, I.R. Electrical Equipment of Power Plants and Substations: Study Guide. – Saint Petersburg: Lan Publishing House, latest edition.
6. Law of the Republic of Kazakhstan "On Electric Power Industry".
7. Rules for Electrical Installations (Electrical Installation Code).
8. Rules for the Technical Operation of Power Plants and Electric Networks.
9. Occupational Health and Safety Rules for the Operation of Electrical Installations.

5.2 Additional References

1. Kitayev, V.E. Power Plants and Substations: Study Guide.
2. Bessonov, L.A. Fundamentals of Electrical Engineering.
3. Venikov, V.A. Transient Processes in Electric Power Systems.
4. Bushuyev, V.V. Electric Power Industry: Current State and Development Prospects.
5. Katsman, M.M. Electrical Machines.
6. International Electrotechnical Commission (IEC) Standards.
7. Institute of Electrical and Electronics Engineers (IEEE) Standards and Scientific Publications.
8. Current scientific publications indexed in IEEE Xplore, Scopus, and Web of Science databases.
9. Research articles published in leading international peer-reviewed journals in the field of Electrical Power Engineering.