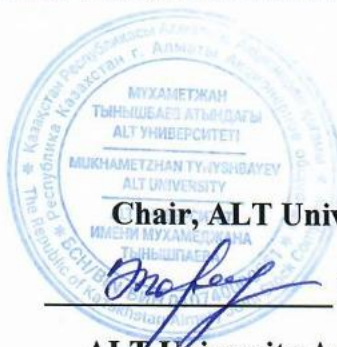


JSC «ALT University named after Mukhamedzhan Tynyshpayev»



APPROVED

Chair, ALT University Academic Council

M. S. Zharmagambetova

**ALT University Academic Council Decision
dated 30 April 2026 (Minutes No. 8)**

PROGRAMME

of the entrance examination for admission to doctoral studies

Educational Programme Group: D210 – Trunk Networks and Infrastructure

Educational Programme: 8D07164 – Transport Infrastructure Engineering

Programme Track: Scientific and Pedagogical

Almaty 2026

The entrance examination programme was discussed and approved at a meeting of the Department of Transport Construction, Minutes No. 7a dated 20 April 2026.

**Acting Head of the Department
of Transport Construction** _____



T. Zh. Tulemissov

The entrance examination programme was endorsed by the Institute of Transport and Construction Council, Minutes No. 8 of 24 April 2026.

**Chair of the Council of the Institute
of Transport and Construction** _____



N. Z. Suleyeva

CONTENTS

1.	Purpose of the entrance examination	4
2.	Entrance examination format and procedure	4
3.	Types and assessment criteria	4
3.1.	Essay types and assessment criteria	4
3.2.	Criteria for assessing answers to electronic examination ticket questions	5
3.3.	Interview assessment criteria	6
4.	Content of examination materials	6
4.1.	Essay topics	6
4.2.	List of disciplines included in the entrance examination	7
4.3.	Content of the entrance examination blocks	7
4.4.	List of interview questions	8
5.	Recommended reading	10
5.1.	Core literature	10
5.2.	Supplementary literature	11

1. PURPOSE OF THE ENTRANCE EXAMINATION

The purpose of the entrance examination is to determine the level of theoretical and practical preparation of applicants to doctoral studies and assess whether their knowledge and skills meet the requirements of the programme.

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

- 1) an interview with the applicant conducted by the Examination Committee;
- 2) writing an essay;
- 3) answering examination questions relating to the educational programme group profile.

2. ENTRANCE EXAMINATION FORMAT AND PROCEDURE

The entrance examination lasts 3 hours and 30 minutes, during which the applicant is interviewed, writes an essay and answers an electronic examination ticket comprising 3 questions. The questions and essay topic are selected at random. The maximum score for the entrance examination is 100 points: 20 points for the essay, 50 points for the educational programme group profile examination and 30 points for the interview.

3. TYPES AND ASSESSMENT CRITERIA

3.1. ESSAY TYPES AND ASSESSMENT CRITERIA

Essay types	Description	Essay length
Motivational	The applicant's rationale for the motivations underlying their intended research activities (research statement)	At least 250 words
Research and analytical	The applicant's justification of the relevance and methodology of the proposed research (research proposal)	
Problem-based thematic	Presentation of the author's position on current issues in the subject area	

Criteria	Descriptors	Points
Depth of topic development	the issue is addressed at a theoretical level using scientific terms and concepts correctly	4
	an original viewpoint (position or attitude) is presented in addressing the issue	4
Argumentation and evidence base	arguments from scientific literature and sources relevant to the essay topic are provided	4
Coherence and logic of presentation	the essay demonstrates compositional coherence and its structural components are logically connected	4
Language proficiency	a high standard of academic writing is demonstrated (vocabulary, command of scientific terminology, grammar and style)	4
	Maximum score	20

3.2. CRITERIA FOR ASSESSING ANSWERS TO THE ELECTRONIC EXAMINATION TICKET

The educational programme group profile examination comprises 3 question blocks: Question 1 assesses the level and systematic nature of theoretical knowledge; Question 2 assesses the development of functional competencies; and Question 3 assesses systemic competencies. The maximum score is 50 points.

The electronic examination ticket consists of 3 questions:

Blocks	Nature of the question	Points
Question 1	theoretical – assesses the level and systematic nature of theoretical knowledge	10
Question 2	practical – assesses the development of functional competencies (ability to apply methods, technologies and techniques in the subject area)	20
Question 3	assesses systematic understanding of the subject area and specialised knowledge of research methodology (systemic competencies)	20
Total:		50

Criteria for assessing answers to the electronic examination ticket:

Question	Assessment criteria	Points
Question 1	demonstrates knowledge of core processes in the subject area; depth and completeness of the answer	5
	expresses an original opinion on the issue logically and coherently	3
	demonstrates command of the conceptual framework and scientific terminology	2
	Total:	10
Question 2	applies methods, techniques and technologies to solve problems in the subject area	7
	provides reasoned arguments; compares and classifies phenomena, events and processes; and draws conclusions and generalisations based on practical skills	7
	analyses information from various sources	6
	Total:	20
Question 3	critically analyses and evaluates theoretical and practical developments, scientific concepts and current trends in science	7
	synthesises methodological approaches to interpreting key problems in the subject area	7
	identifies cause-and-effect relationships when analysing processes, phenomena and events	6
	Total:	20
	TOTAL:	50 points

3.3. INTERVIEW ASSESSMENT CRITERIA

N o.	Criteria	Descriptors	Points
1.	Motivation	Rationale for pursuing doctoral studies in the chosen educational programme and enrolling at a particular university. A vision of professional and personal growth prospects upon completion.	5
2	Research competence	Possession of the research skills and experience required for research in a specific subject area.	10
3.	Creativity	Original thinking and creative and alternative approaches to solving problems and case-based tasks.	10
4.	Communication skills	Ability to present one's viewpoint concisely, meaningfully, logically and persuasively; draw generalisations and conclusions; and demonstrate language proficiency.	5
Maximum score:			30

4. CONTENT OF EXAMINATION MATERIALS

4.1. ESSAY TOPICS

No.	Essay topics
1	Current trends in transport infrastructure development amid the digital transformation of the economy.
2	The role of transport infrastructure in ensuring the sustainable socio-economic development of the Republic of Kazakhstan.
3	Innovative technologies for the design, construction and operation of transport infrastructure facilities.
4	Digitalisation of transport infrastructure as a factor in enhancing the safety and efficiency of the transport system.
5	Prospects for applying artificial intelligence technologies in transport infrastructure engineering.
6	Research as the foundation for the development of modern transport engineering.
7	Engineering solutions to improve the reliability and durability of transport infrastructure.
8	Development of Kazakhstan's transport corridors within the system of international logistics routes.
9	Modern methods for diagnosing, monitoring and assessing the technical condition of transport infrastructure.
10	Environmental sustainability of transport infrastructure: current challenges and solutions.
11	Application of Building Information Modelling (BIM) in transport infrastructure design.
12	Use of geographic information systems (GIS), Earth remote sensing and digital technologies in transport infrastructure engineering.
13	Modern materials and construction technologies for transport structures.
14	Ensuring transport infrastructure safety amid climate change and growing technological risks.
15	Intelligent transport systems (ITS) as the basis for the development of modern transport infrastructure.
16	Scientific and technical challenges in railway infrastructure operation and ways to address them.

17	Development of Kazakhstan's road infrastructure amid increasing population mobility.
18	Innovative technologies for the construction and operation of bridges, overpasses and tunnels.
19	Improving the efficiency of engineering surveys using modern geodetic technologies.
20	Digital technology-based life-cycle management of transport infrastructure facilities.
21	Modern methods for evaluating the effectiveness of transport infrastructure investment projects.
22	Scientific approaches to the development of multimodal transport infrastructure.
23	Human capital development and research personnel training for Kazakhstan's transport sector.
24	Research methodology in transport infrastructure engineering.
25	The role of research, education and industry in the development of transport infrastructure in the Republic of Kazakhstan.
26	Prospects for implementing smart transport infrastructure technologies (Smart Infrastructure).
27	Use of Big Data, digital twins and predictive analytics in transport infrastructure management.
28	International experience in transport infrastructure development and its potential application in Kazakhstan.
29	Strategic directions for modernising transport infrastructure in the Republic of Kazakhstan through 2050.
30	Research and innovation development of transport infrastructure engineering as a factor in enhancing the competitiveness of the national economy.

4.2. LIST OF DISCIPLINES INCLUDED IN THE ENTRANCE EXAMINATION

The entrance examination materials for doctoral studies in the D210 – Trunk Networks and Infrastructure educational programme group, including essay topics and profile examination questions, are provided in three languages: Kazakh, Russian and English.

The examination questions cover selected sections of the curricula prescribed for the D210 – Trunk Networks and Infrastructure educational programme group.

N o.	Discipline titles
1	Organisation and Planning of Research
2	Structure of Transport Infrastructure Facilities
3	Design and Cost Estimating in Transport Construction
4	Innovative Technologies in Transport Construction
5	Diagnostics of Transport Infrastructure Facilities
6	Strengthening Transport Infrastructure Facilities

4.3. CONTENT OF THE ENTRANCE EXAMINATION BLOCKS

Block 1. Design, Construction and Operation of Transport Infrastructure Facilities

Section content:

- engineering surveys for transport infrastructure facilities;
- fundamentals of transport infrastructure facility design;
- construction technologies for transport infrastructure facilities;

- organisational principles of transport infrastructure facility construction;
- fundamentals of routine maintenance of transport infrastructure facilities;
- fundamentals of major repair of transport infrastructure facilities;
- fundamentals of transport infrastructure facility reconstruction;
- reliability, durability and safety of transport infrastructure facilities;
- diagnostics of transport infrastructure facilities;
- regulatory and technical support for the design, construction and operation of transport infrastructure.

Block 2. Materials and Innovative Technologies Used in Transport Infrastructure Facilities

Section content:

- modern construction materials for transport infrastructure facilities;
- railway track materials;
- materials for roads and airfield pavements;
- materials for linear pipelines;
- materials for transport engineering structures;
- protection of construction materials and structures against operational effects;
- quality control of materials and construction work at transport infrastructure facilities;
- construction material testing methods;
- reliability and durability of materials used in transport infrastructure facilities;
- requirements for materials used in transport structures.

Block 3. Research, Digitalisation and Transport Infrastructure Management

Section content:

- research methodology in transport infrastructure engineering;
- digital transformation of transport infrastructure;
- information modelling of transport infrastructure facilities (BIM);
- geographic information systems (GIS), Earth remote sensing and geospatial technologies;
- artificial intelligence, big data and digital twins in transport infrastructure;
- intelligent transport systems (ITS) and automated transport infrastructure management;
- monitoring, diagnostics and management of the technical condition of transport infrastructure facilities;
- project and life-cycle management of transport infrastructure facilities;
- scientific and technical support for the sustainable development of transport infrastructure;
- current trends in transport infrastructure development in the Republic of Kazakhstan and the global transport sector.

4.4. LIST OF INTERVIEW QUESTIONS

1. Describe the types, scope and significance of engineering surveys in the design of transport infrastructure facilities.

2. Identify the principal design principles and stages for transport infrastructure facilities. What factors have the greatest influence on the selection of design solutions?
3. Explain the technological fundamentals of constructing railways, roads, linear pipelines and engineering structures.
4. Describe the organisational principles of transport infrastructure facility construction and the distinctive features of construction production management.
5. What are the objectives of routine maintenance of transport infrastructure facilities? Identify the principal types of work.
6. Explain the purposes, objectives and technologies of major repair of transport infrastructure facilities.
7. Explain the purpose of reconstructing transport infrastructure facilities and how reconstruction differs from major repair.
8. What factors determine the reliability, durability and safety of transport infrastructure facilities?
9. Describe modern methods for diagnosing the technical condition of transport infrastructure facilities.
10. Which regulatory and technical documents govern the design, construction and operation of transport infrastructure in the Republic of Kazakhstan?
11. What modern construction materials are used in transport infrastructure facilities? Describe their principal properties.
12. Identify the principal railway track superstructure materials and the requirements that apply to them.
13. Describe the materials used in the construction of roads and airfield pavements.
14. What materials are used in the construction and operation of trunk linear pipelines?
15. Describe the materials used in the construction of bridges, tunnels, overpasses and other transport infrastructure engineering structures.
16. What types of operational effects influence construction materials and structures? What protection methods are used to improve their durability?
17. Explain the quality control system for construction materials and construction work at transport infrastructure facilities.
18. Identify the principal laboratory and field testing methods for construction materials used in transport construction.
19. What factors determine the reliability and durability of construction materials used in transport infrastructure?
20. What key requirements apply to construction materials used in transport structures?
21. Explain the content of research methodology in transport infrastructure engineering. Which research methods are most widely used in the transport sector?
22. Describe the principal areas of digital transformation of transport infrastructure in the Republic of Kazakhstan.
23. Explain the essence of Building Information Modelling (BIM) and its application at the stages of the life cycle of transport infrastructure facilities.
24. How are geographic information systems (GIS), Earth remote sensing and geospatial technologies used in transport infrastructure engineering?
25. Describe the potential applications of artificial intelligence, Big Data and digital twins in the design, operation and management of transport infrastructure.
26. Explain the purpose of intelligent transport systems (ITS) and automated transport infrastructure management systems.
27. What modern methods for monitoring, diagnosing and managing the technical condition of transport infrastructure facilities are used at the various stages of their life cycle?

28. Describe the key principles of project and life-cycle management for transport infrastructure facilities.
29. Explain scientific and technical approaches to the sustainable development of transport infrastructure, taking economic, environmental and social factors into account.
30. Analyse current trends in transport infrastructure development in the Republic of Kazakhstan and the global transport sector. Which strategic development areas are the most promising?

5. RECOMMENDED READING

5.1 Core Literature

1. Организация, планирование и управление строительством / Под ред. А.Г. Лапи-дуса. – М.: Издательство АСВ, 2020. – 544 с.
2. Инженерные изыскания для строительства / Под ред. В.Т. Трофимова. – М.: Издательство АСВ, 2020. – 608 с.
3. Строительные материалы / Под ред. В.Г. Микульского. – М.: Издательство АСВ, 2021. – 520 с.
4. Надежность строительных конструкций и сооружений / Под ред. В.М. Бонда-ренко. – М.: Издательство АСВ, 2018. – 496 с.
5. Методология научных исследований / Под ред. В.И. Добренкова. – М.: ИН-ФРА-М, 2021. – 320 с.
6. Кудрявцев В.А., Першин С.П. Проектирование железных дорог. – М.: Маршрут, 2019. – 624 с.
7. Бугаенко В.М., Кондратенко В.И. Железнодорожный путь. – М.: УМЦ ЖДТ, 2020. – 560 с.
8. Иванов В.Н., Жинкин Г.Н. Строительство железных дорог. – М.: УМЦ ЖДТ, 2018. – 512 с.
9. Гапанович В.А. Техническая эксплуатация железнодорожного пути. – М.: УМЦ ЖДТ, 2021. – 580 с.
10. Осипов В.О. Искусственные сооружения на железных дорогах. – М.: УМЦ ЖДТ, 2019. – 480 с.
11. Абдурашитов А.А. Диагностика железнодорожного пути. – М.: УМЦ ЖДТ, 2020. – 432 с.
12. Справочник инженера путевого хозяйства / Под ред. В.А. Гапановича. – М.: УМЦ ЖДТ, 2021. – 780 с.
13. Федотов Г.А. Изыскания и проектирование автомобильных дорог. – М.: Ака-демия, 2019. – 496 с.
14. Каверин В.И. Организация строительства автомобильных дорог. – М.: Акаде-мия, 2018. – 432 с.
15. Бабков В.Ф. Дорожные условия и безопасность движения. – М.: Транспорт, 2017. – 416 с.
16. Васильев А.П. Автомобильные дороги. – М.: Академия, 2020. – 640 с.
17. Васильев А.П. Эксплуатация автомобильных дорог. – М.: Академия, 2019. – 480 с.
18. Подольский В.П. Дорожно-строительные материалы. – М.: Инфра-Инженерия, 2021. – 510 с.
19. Веретельников Г.К. Мосты, тоннели и транспортные развязки. – М.: Издатель-ство АСВ, 2020. – 620 с.
20. Коршак А.А., Нечваль А.М. Проектирование и эксплуатация магистральных нефтегазопроводов. – СПб.: Лань, 2020. – 540 с.

21. Коршак А.А. Строительство магистральных трубопроводов. – СПб.: Лань, 2019. – 470 с.
22. Соколов С.В. Магистральные трубопроводы. – СПб.: Лань, 2021. – 448 с.
23. Гумеров А.Г. Материалы трубопроводного транспорта. – СПб.: Лань, 2021. – 420 с.
24. Гумеров В.Г. Эксплуатация магистральных трубопроводов. – М.: Недра, 2020. – 460 с.
25. Владимиров А.И. Диагностика и надежность магистральных трубопроводов. – М.: Недра, 2022. – 510 с.

5.2 Supplementary Literature

1. Теличенко В.И. Контроль качества строительных материалов и строительных работ. – М.: Издательство АСВ, 2019. – 448 с.
2. Сизов В.П. Материаловедение в транспортном строительстве. – М.: Инфра-Инженерия, 2020. – 468 с.
3. Болотин В.В. Прогнозирование ресурса строительных конструкций. – М.: Высшая школа, 2018. – 360 с.
4. Лапидус А.Г. Управление строительными проектами. – М.: Издательство АСВ, 2021. – 410 с.
5. Перов В.А. Диагностика транспортных сооружений. – М.: Инфра-Инженерия, 2020. – 390 с.
6. Каменев В.В. Реконструкция транспортных сооружений. – М.: Издательство АСВ, 2019. – 440 с.
7. Подольский В.П. Эксплуатация транспортных сооружений. – М.: Академия, 2018. – 420 с.
8. Гинзбург А.В. Организация строительного производства. – М.: Издательство АСВ, 2020. – 512 с.
9. Бондаренко В.М. Техническая диагностика строительных конструкций. – М.: Издательство АСВ, 2019. – 384 с.
10. Справочник дорожного инженера / Под ред. А.П. Васильева. – М.: Транспорт, 2019. – 720 с.
11. Закон Республики Казахстан «Об архитектурной, градостроительной и строительной деятельности в Республике Казахстан».
12. Закон Республики Казахстан «Об автомобильных дорогах».
13. Технический регламент Республики Казахстан «Требования к безопасности зданий и сооружений, строительных материалов и изделий».
14. Строительные нормы Республики Казахстан (СН РК), Своды правил (СП РК) и государственные нормативы в области архитектуры, градостроительства и строительства, регламентирующие проектирование, строительство и эксплуатацию железных дорог, автомобильных дорог, мостов, тоннелей и магистральных трубопроводов (действующие редакции).
15. Государственные стандарты Республики Казахстан (СТ РК) и межгосударственные стандарты (ГОСТ) по инженерным изысканиям, строительным материалам, транспортным сооружениям, магистральным трубопроводам, контролю качества, надежности и безопасности объектов транспортной инфраструктуры.