ABYLKAS SAGINOV KARAGANDA TECHNICAL UNIVERSITY

Academic Council
Protocol № 11
from " 04 **"** 06 **2024 y.**

PROGRAM
The ENTRANCE EXAM
for admission to the doctoral program
Educational program (8D07201 – Geology and exploration of mineral deposits)

Department: GEMD
Compiled by:
(Doctor of Technical Sciences, Professor Portnov V.S.)
(acting associate professor, PhD Kopobayeva A.N.)

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Preface

The program of the entrance exam was developed by: Doctor of Technical Sciences Portnov V.S., PhD Kopobayeva A.N.

Discussed at the meeting of the Department of GRMPI

Protocol No. 14 dated March 04, 2024.

Head of the department _____ Isataeva F.M. "____"_____2024 G.

(signature)

Introduction

The main tasks of preparing doctoral students for the educational program 8D07201 "Geology and exploration of mineral deposits" are: training postgraduate specialists with a high level of professionalism, a culture of professional communication, having a civic position, able to formulate and practically solve modern practical problems in the field of geology.

The database of examination materials for entrance exams to doctoral studies in the educational program 8D07201 "Geology and exploration of mineral deposits" for 2024-2025 academic year:

The structure and content of the exam according to the profile of the group of educational programs

1. The electronic examination card consists of 3 questions:

Blocks	The nature of the question	The number of points
1st question	theoretical - determines the level and consistency of theoretical knowledge	10
2nd question	practical - reveals the degree of formation of functional competencies (the ability to apply techniques, technologies and techniques in the subject area)	15
3rd question	reveals a systematic understanding of the studied subject area, specialized knowledge in the field of research methodology (system competencies)	25
total		50

2 Materials for entrance exams

2.1 Questions on the first block –

50 - for the GOP of the natural-technical direction

1. General ideas about the tectonosphere and the deeper bowels of the Earth
2. The main stages of geotectonics development
3. The development of tectonic deformations in temporary geological processes
4. Folded-discontinuous dislocations
5. Dynamic conditions of crease formation
6. Kinematic conditions for the formation of folds
7. Geological conditions of the formation of folds
8. Crustal ruptures

9. Vertical and lateral zonation of dislocations, tectonodynamic systems
10. Tectonic covers (sharyazhi)
11. Analysis of formations.
12. Analysis of facies and capacities. The volumetric method
13. Methods of studying deformations of the geological past
14. Methods of studying tectonic movements
15. Methods of studying tectonic movements and deformations of the geological past (paleotectonic and neotectonic analyses
16. Ring structures and their nature
17. Conflict
18. The main types of intraplate dislocations
19. Modern manifestations of intraplate tectonic and magmatic activity
20. Intraplate tectonic processes
21. Analysis of formations.
22. Lithodynamic complexes
23. Analysis of interruptions and disagreements
24. Paleomagnetic methods
25. Track thermochronology
26. Obduction
27. Structural and geomorphological methods (neotectonic analysis)
28. The interior of the oceans
29. Mid-ocean ridges
30. Transform faults
31. Abyssal plains
32. Intraplate hills and ridges
33. Microcontinents
34. Age and origin of oceans
35. Continent/ocean transition areas
36. The structure and development of passive suburbs
37. Active suburbs and their development
38. Transformative suburbs
39. Folded belts of continents - orogeny
40. General characteristics of folded belts
41. The internal structure of the folded belts
42. The development of folded belts
43. Continental platforms - cratons
44. The internal structure of the foundation of ancient platforms
45. Structural elements of the surface of the foundation and sedimentary cover of platforms
46. Stages of platform development
47. Benioff Zones
48. Tectonic regimes of subduction zones
49. Continental subduction
50. Sedimentary formations of the slab cover and the evolution of the structural plan of the platforms

Recommended literature

1. Khain V.E., Lomize M.G. Geotectonics with the basics of geodynamics. Textbook-2nd ed., and supplement-M.: KDU, 2005. - 560 p.

2.2 Questions on the second block –

50 - for the GOP of the natural-technical direction

1. General ideas about clarks
2. Geochemical features of the main geological processes
3. Factors determining the geochemical specificity of igneous rocks
4. Factors determining the geochemical specificity of sedimentary rocks Factors determining the geochemical specificity of metamorphic rocks
5. The main sources of inaccuracy of geochemical data
6. The use of geochemical data in the study of igneous rocks
7. Classification of igneous rocks
8. Classification of rocks of the main composition
9. Classifications of granitoids
10. Studying the features of the evolution of igneous rocks
11. Characteristics of geochemical processes based on the interpretation of variation diagrams
12. Interpretation of REE distribution trends
13. Interpretation of multi-element diagrams
14. Numerical modeling of geochemical processes
15. Determination of geodynamic conditions for the formation of magmatic complexes
16. Discrimination diagrams for rocks of basalt and andesite composition
17. Discriminatory diagrams used to determine the geodynamic conditions of the formation of granitoids
18. The use of geochemical data in the study of sedimentary rocks
19. Petrochemical genetic modules used in the study of sedimentary rocks
20. Diagrams used in the study of sedimentary rocks
21. Variation diagrams for sedimentary rocks
22. Indicator diagram of post-sedimentation changes in carbonate rocks
23. Geochemical studies of chemogenic and organogenic deposits
24. Study of REE distribution in sedimentary deposits
25. The use of geochemical data in the study of metamorphic rocks
26. The use of radiogenic isotopes
27. Mass spectrometric measurements
28. Methods of absolute geochronology
29. Dating methods based on the principle of isochronous constructions (Rb-Sr, Sm-Nd and Re-Os)
30. Dating methods based on radioactive accumulation of lead (U—R and Pb—R)
31. Evolution of the isotopic composition of the Earth and model ages
32. Methods of dating by cosmogenic isotopes

33. Isotopic geochemistry
34. Radiogenic isotopes in the magmatic process
35. Radiogenic isotopes in the sedimentary process
36. The use of stable isotopes
37. The use of geochemical data in the study of rock-forming minerals
38. Geochemistry of rock-forming minerals
39. Use of hydrogen isotopes
40. The use of carbon isotopes
41. K-Ag and 39Ar/4WAr dating methods
42. The use of sulfur isotopes
43. The use of oxygen isotopes
44. Elemental facies indicators
45. Various modules for sedimentary rocks in the interpretation of geochemical data
46. The main groups of elements used in geochemical research
47. The group of rare earth elements
48. Separation coefficients in the description of magmatic processes
49. The main processes controlling the chemical composition of igneous rocks
50. The main processes controlling the chemical composition of sedimentary rocks

Recommended literature

1. Edited by B.V. Sklyarov. Interpretation of geochemical data. Textbook / - M: Intermet Engineering, 2001- p. 288.

2.3 Questions about the third block

50 - for the GOP of the natural-technical direction

1. Noogeology - the geology of the future
2. Earth and space: the impact of space processes on the development of the Earth
3. Energy sources of deep geological processes
4. Problems of rifting
5. The mysteries of ring structures
6. Fractality of the Earth's crust and lithosphere
7. Orientation and cyclicity in the evolution of the Earth
8. Continuity, gradualism or discontinuity, discontinuity (punctualism) in the development of geological processes and the organic world
9. The heyday of organic life at the turn of the Precambrian and Phanerozoic
10. The Great Glaciations
11. The birth of planet Earth
12. The first crust of the Earth. Possible composition and method of formation
13. Origin and age of the World Ocean
14. The origin of granites
15. Plate tectonics: when and how did it begin?
16. The formation of the first Pangaea

17. Gray Gneiss and the origin of continents
18. The origin of life on Earth
19. Geospheres of the solid Earth
20. The Earth's crust and upper mantle are lithosphere, asthenosphere and mesosphere.
21. Dynamics of internal geospheres
22. Geodynamic systems and cycles
23. Mantle plumes and their role in geodynamics.
24. The evolution of the planet Earth.
25. Modern structure and relief of the Earth.
26. The Rotation of the Earth and its geodynamic Consequences.
27. Methods of studying vertical movements
28. Modern movements of the Earth's crust, methods and results of their study
29. The concept of tectonics of lithospheric plates and mantle plumes
30. Methods for studying horizontal movements
31. Rifting, tectonic processes at divergent and transform boundaries of lithospheric plates
32. Global rift zone system
33. Continental rifting {Block}=3
34. Ocean rifting
35. Active and passive rifting
36. Subduction, obduction and collision (tectonic processes at convergent boundaries of lithospheric plates
37. Expression of subduction zones in relief
38. Tectonic position and main types of subduction zones
39. Geophysical expression of subduction zones
40. Benioff Zones
41. Geological expression of subduction zones
42. Kinematics of subduction
43. Segmentation of subduction zones
44. Conditions of laying and dying of subduction zones
45. Platform magmatism

46. Magmatism of intracontinental orogens
47. Intracontinental orogeny – time distribution
48. Regional faults and suture zones (sutures)
49. Fold-rupture dislocations

Recommended literature

1. Khain V.E., Lomize M.G. Geotectonics with the basics of geodynamics. Textbook-2nd ed., and supplement-M.: KDU, 2005. - 560 p.
2. Khain V.E. The main problems of modern geology / Russian Academy of Sciences, Department of Earth Sciences, Institute of the Lithosphere of the surrounding and internal. the seas. - 2nd ed., supplement - M.: Scientific world, 2003. - 346 p.

3 The Subject of the Essay

№	Эссе тақырыбы (қазақ тілінде)	Эссе тақырыбы (орыс тілінде)	Эссе тақырыбы (ағылшын тілінде)
1	Жер қойнауын пайдаланудағы қатынастарды мемлекеттік реттеудің негізгі міндеті	Основная задача государственного регулирования отношений в недропользовании	The main task of state regulation of relations in subsurface use
2	Ғаламның пайда болу гипотезалары	Гипотезы происхождения Вселенной	Hypotheses of the origin of the Universe
3	Қазақстанның минералдық-шикізат базасын кеңейтудің факторлары мен міндеттері	Факторы и задачи расширения минерально-сырьевой базы Казахстана	Factors and challenges of expanding the mineral resource base of Kazakhstan
4	Ғаламның пайда болу гипотезалары	Гипотезы происхождения Вселенной	Hypotheses of the origin of the Universe
5	Тектоникадағы изотоптық әдістер	Изотопные методы в тектонике	Isotope methods in tectonics
6	Минералды түзілу процестері. Олардың жүйеленуі	Процессы минералообразования. Их систематика	Mineral formation processes. Their taxonomy
7	Таулы аймақтардың пайда болу гипотезалары (геосинклиналды, плиталардың тектоникасы).	Гипотезы образования горноскладчатых сооружений (геосинклинальная, тектоники плит).	Hypotheses of the formation of rock-laying structures (geosynclinal, plate tectonics).
8	Литосфералық плиталар динамикасының теориясы және оның қазіргі геологиядағы рөлі	Теория динамики литосферных плит и ее роль в современной геологии	Theory of lithospheric plate dynamics and its role in modern geology
9	Шөгінді жыныстарды жіктеу принциптері	Принципы классификации осадочных пород	Principles of classification of sedimentary rocks
10	Қазақстанның мұнайлы-газды провинцияларының шөгінді жыныстары тобының өкілдері	Представители групп осадочных пород нефтегазоносных провинций Казахстана	Representatives of sedimentary rock groups of oil and gas-bearing provinces of Kazakhstan
11	Аймақтық метаморфизм факторлары.	Факторы регионального метаморфизма.	Factors of regional metamorphism.
12	Кен орындарын геологиялық-өнеркәсіптік бағалау	Геолого-промышленная оценка месторождений	Geological and industrial assessment of deposits
13	Пайдалы қазбалар қорларын есептеу әдістері бойынша салыстырмалы талдау	Сравнительный анализ по методам подсчета запасов полезных ископаемых	Comparative analysis of methods for calculating mineral reserves
14	Тау жыныстарының жасын анықтаудың заманауи әдістері	Современные методы определения возраста горных пород	Modern methods for determining the age of rocks

15	Қазақстанның минералдық-ресурстық әлеуеті	Минерально-ресурсный потенциал Казахстана	Mineral resource potential of Kazakhstan
16	Каспий маңы ойпатының минералдық-ресурстық әлеуеті	Минерально-ресурсный потенциал Прикаспийской впадины	Mineral resource potential of the Caspian Basin
17	Геологиялық барлау жұмыстарын ұйымдастырудың мақсаттары мен міндеттері	Цели и задачи организации геологоразведочных работ	Goals and objectives of the organization of geological exploration
18	Жердің геологиялық тарихын қайта құру әдістері	Методы реконструкции геологической истории Земли	Methods of reconstruction of the geological history of the Earth
19	Магмалық жыныстар және олардың қазіргі классификациясы	Магматические породы и их современные классификации	Igneous rocks and their modern classifications
20	Уилсон мен Бертран циклдері: ұқсастықтар мен айырмашылықтар	Циклы Вильсона и Бертрана: сходство и различия	Wilson and Bertrand cycles: Similarities and differences

4 Recommended literature

1. Khain V.E., Lomize M.G. Geotectonics with the basics of geodynamics. Textbook-2nd ed., and supplement-M.: KDU, 2005. - 560 p.

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