INTERVIEW QUESTIONS
for admission into Master's program
Theory and Design of Buildings and Structures

08.04.01 Civil Engineering

1. Shallow foundations. The effect of central and eccentric vertical loads pressure on the foundation parameters.

2. The design of foundations for reinforced concrete and metal columns. Prefabricated and monolithic foundations. The foundation-to-structure above connection.

3. Shallow foundations. The effect of geological profile, climatic conditions and building design characteristics on the foundation depth.

4. The limit state calculation of rigid foundations. Constructive measures to reduce structural failure.

5. The foundation stability testing by the method of slices. The foundations pull-out analysis.

6. Pile foundations. The analysis of the allowable pile bearing load depending on materials and soil strength by a practical method.

7. The service limit state calculation of pile foundations. Pile tips stress check.

8. Pile foundations. The analysis of the allowable pile bearing load depending on field tests results.

9. Soils strength. Coulomb's Law. Mohr-Coulomb's limit equilibrium equation. Test methods. Field and laboratory methods for determining strength characteristics.

10. Soils deformation. Compression tests. The structural strength of soils. The modulus of deformation, the lateral pressure coefficient.

11. Concrete. Classification, physical and mechanical characteristics, normative and calculated resistance of concrete.

12. Reinforcement steel. Classification, physical and mechanical characteristics, normative and calculated resistance of reinforcement steel.

13. Prestressed reinforced concrete structures. Prestress purpose and causes.

14. Principles of the ultimate limit state calculation of the flexible reinforced concrete member. Three stages of stress strain state.

15. Reinforced concrete floor slabs – hollow-core and T-shaped. Calculation schemes, reinforcement schemes, calculation principles.

16. Reinforced concrete girders of multi-storey industrial and civil buildings. Constructive solutions. Calculation principles.

17. Reinforced concrete columns of multi-storey industrial and civil buildings. The strength and stability analysis of compressed reinforced concrete elements.

18. Post footing for multi-storey buildings columns. Foundation structural strength calculations.

19. Principles of the service limit state calculation of reinforced concrete structures. Clinking and crack growth calculations.

20. Reinforced concrete shell structures: design, reinforcement, analysis.

21. Construction steel and aluminum alloys. Steel behaviour under uniaxial tension and combined stresses. Normative and calculated steel resistance.

22. Principles of the limit state calculation of metal structures. Types of limit states. Load impact.

23. Structural steel connections. Constructive solutions and the analysis of welded and bolted connections under static loading.

24. The steel beam grillage. Rolled steel beams and plate girders.

25. Axially loaded steel columns. Constructive solutions, stability testing. The steel columns structure.

26. Steel trusses. Classification, proportioning of truss sections. Constructive solutions for steel trusses.

27. Single-storey steel-framed industrial buildings. Connections in single-storey industrial buildings. Light metal constructions of complete delivery.

28. Steel columns for single-story industrial buildings. Types of cross sections. The effective column length. The eccentrically loaded column design and analysis.

29. Large-span steel structures. Constructive solutions for arch and spatial systems of large-span shells.

30. Steel plate systems. Steel plate systems efficiency. Low pressure vertical cylindrical tanks, calculation principles.

31. Masonry materials. Physico-mechanical properties of masonry.

32. Service limit state and ultimate limit state calculations of masonry.

33. The design and analysis of masonry elements with indirect and longitudinal reinforcement.

34. Brick walls. The calculation of constant and variable wall thickness.

35. Timber members. The limit state calculation of axially loaded and bending timber members.

36. Connections in timber structures. The design and analysis.

37. The design and analysis of wooden decks, girders and wood veneered panels.

38. Wooden beams and posts. The analysis of glulam beams and posts.

39. Wooden trusses. The structural analysis.

40. Wooden arches. The design and analysis.

41. Wooden frames. The design and analysis.

42. Ways to improve reliability and durability of wooden structures.