QUESTIONS FOR THE MASTER 'S DIPLOMA EXAMINATION IN THE FIELD OF CIVIL ENGINEERING

Specialisation: Construction of road infrastructure

1. Factors affecting the pressure of the concrete mix on the formwork walls.
2. Special methods of concreting (e.g. shotcreting, underwater concreting, concreting massive structures).
3. The displacement method in the analysis of bar structures.
4. Types of non-static loads in structural mechanics.
5. Free and forced vibrations of systems. Definition of the dynamic coefficient. Resonance.
6. Prestressed structures; pre-tensioned and post-tensioned concrete; principles of static behaviour.
7. Losses of prestressing force in pre-tensioned and post-tensioned concrete elements: types and principles of calculation.
8. Ultimate limit states of prestressed elements (bending, shear).
9. Requirements for concrete and steel used in prestressed structures.
10. Discuss the support structures of steel chimneys.
11. Discuss the construction of structural roofing system.
12. Tank installation methods.
13. Bar reinforcement of ground level steps (benching reinforcement). Transverse reinforcement - reinforcement characteristics and structural calculations.
14. Characteristics of geosynthetics (woven, non-woven and knitted geotextiles) and related products (geogrids).
15. Technical and functional classification of roads. Basics of road route design.
16. Stress matrix. Matrix invariants, principal stresses. Stress-strain relations.
17. Deep excavation support. Impact of deep excavations on neigbouring structures.
18. Methods of constructing underground storeys in closed excavations.
19. Traffic measurements and forecasting.
20. Road and intersection capacity.
21. Traffic management and road safety.
22. Methods for dimensioning flexible, semi-rigid, and rigid pavement structures.
23. Pavement strengthening design – deflection method and mechanistic approach.
24. Computer-aided road design.
25. Digital terrain model.
26. Cost estimates - types and basis of their preparation.
27. Methods for evaluating the economic efficiency of road and bridge investments.
28. Road alignment design in plan, longitudinal profile and cross-section.
29. Design of earthworks and drainage elements in road construction.
30. Pavement condition diagnostics.
31. Pavement maintenance systems.

32. Road materials – classification, production, properties and applications.
33. Asphalt pavements.
34. Cement concrete pavements.
35. Moving rail and traffic loads on bridge structures.
36. Methods of construction of monolithic reinforced concrete bridges.
37. Structural systems of cable-stayed and suspension bridges.
38. Intersections – types and geometric design.
39. Road interchanges – characteristics, elements and type selection principles.
40. Signal-controlled intersections.