

**Suggested questions for the diploma exam, second-cycle studies Civil Engineering,
Specialization: Engineering Infrastructure**

1	Briefly discuss the geometrical invariability of bar systems.
2	How are displacements in statically determinate structures determined?
3	Briefly discuss the slope-deflection method (unknowns of this method, degree of geometric indeterminacy, the geometrically determinate member system, the system of equations, the slope-deflection formulas).
4	What are the assumptions of Kirchhoff plate theory?
5	What boundary conditions must the vibration amplitudes of the Navier method satisfy?
6	How are free vibration frequencies of thin, isotropic, linearly elastic, rectangular, simply supported plates determined?
7	What is an environmental health hazard?
8	Clarify the difference between hazard and risk.
9	What causes environmental hazards? List some different types of natural and human-produced hazards.
10	Categories of environmental health hazards: Physical hazards, Biological hazards, Chemical hazards
11	Specify the joints of structural elements: list the joints used for connecting wooden structure elements and specify the application characteristics.
12	Specify the characteristics of rafter roof trusses.
13	Specify the design characteristics of glued laminated timber structures.
14	Specify the characteristics of prefabricated wooden structures.
15	General calculation procedure in Finite Element Method.
16	Application of Finite Element Method in design and calculations of constructions of civil and hydrotechnic engineering.
17	General calculation procedure in Finite Difference Method.
18	Application of Finite Difference Method in mathematics and mechanics.
19	Basic welding technologies
20	Technological treatments preparing for welding
21	Welded joints and welds types
22	Capacity of fillet weldings calculation methods
23	Bolt capacity according to EU 1993-1-8
24	Imperfections in the analysis of global framework
25	Classification of cross sections in steel elements
26	Please discuss the basic components of the weir.
27	Please name and shortly describe the characteristic discharges used in the hydrotechnical industry.
28	What input data does the designer need to design the hydraulic structure, for example weir?

29	Characterize role of range of strain in determination of soil stiffness with particular reference to capability of laboratory equipment and to working strain in the field.
30	Describe qualitatively influence of stress history on shear strength (drained & undrained) and state parameters of soil.
31	Please characterize variables and soil parameters which contribute to slope stability in limit equilibrium method.
32	Give working examples of limit states which control a structure design in geotechnical engineering.
33	The strain tensor in the description of Euler and Lagrange
34	Airy function.
35	Theory of plasticity – the theory of plastic flow
36	Theory of plasticity – the theory of deformation plasticity
37	The value of money in construction industry
38	Risk off construction process management
39	Safety plan off construction process management
40	Business plan for process management
41	Laws in the implementation of investments in the aspect of construction acceptance
42	Provisions of the construction works agreement regarding the acceptance of the construction investment
43	Defects and faults, and enforcement of their failure to comply with the law
44	Public procurement law in public sector investments
45	What are pre-tensioned and post-tensioned concrete structures? Describe differences in their execution and fields of their application.
46	Draw and compare stress-strain diagram for reinforcing steel and prestressing steel for concrete structures.
47	Shortly define all immediate prestress losses in pre-tensioned and post-tensioned concrete structures.
48	Shortly define all time dependent prestress losses in pre-tensioned and post-tensioned concrete structures.
49	Please explain the concept of BIM and its differences from CAD.
50	Present the advantages of BIM in the field of cross-industry coordination.
51	Present and discuss the complexity of BIM models (from 3D to 7D).
52	Characterize the Geotechnical Categories
53	What actions should to be considered in the geotechnical design of structures?
54	Characterize the Ultimate Limit States of spread foundations
55	Characterize the earth pressure acting around retaining structure
56	Geotechnical parameters for linear elastic – perfectly plastic model
57	A brief overview of the development of non-destructive methods for testing concrete in structures
58	Sclerometric methods for testing concrete
59	Acoustic methods for testing concrete
60	Combination of non-destructive methods of concrete control
61	Technical means of automated monitoring of the state of load-bearing structures of buildings

62	Methodology for processing monitoring data
63	Please explain the term “man-made” hazards and briefly describe the
64	Slope Failures and Triggering Mechanisms of Landslide
65	Structures for Flooding Protection
66	Please give some examples of reliability evaluation methods and techniques and briefly describe them
67	Types of limit states, please describe Ultimate limit states more detaile
68	Please specify all relevant information concerning possible limitations and assumptions with respect to their validity and application for semi-probabilistic safety formats