

Annex

to the Dean's Directive No. 4/2020, on Public Announcement of Admission Proceedings to Follow-up Master Degree Study Programmes Organised at the Faculty of Civil Engineering CTU in Prague in the 2021/2022 Academic Year, which further specifies Article 5 – General content of entrance examinations

GENERAL REQUIREMENTS FOR ENTRANCE EXAMINATIONS TO MASTER DEGREE STUDY AT THE FACULTY OF CIVIL ENGINEERING CTU IN PRAGUE

Study programme: **Civil Engineering / Stavební inženýrství**
Branch of study: **Building Structures / Konstrukce pozemních staveb**

and

Study programme: **Civil Engineering**
Branch of study: **Building Structures**

Building Structures – Requirements for structures of buildings, basic structural principles. Structural systems of single-storey and multi-storey, hall and high-rise buildings, expansion of buildings. Structural, material and technological solutions of structural members - vertical bearing structures, floor structures and projecting structures, external claddings, staircases, foundations and the substructure, flat and pitched roofs, finishing structures. Precast structures. Fire safety of buildings. Failures, degradation, reconstruction of buildings. Health safety of buildings. Building physics - thermal protection of buildings, acoustics, daylighting and sun exposure.

Building services – Wastewater disposal, internal and external sewage systems, water supply, interior and exterior water distribution systems, exterior and interior gas piping, discharge of combustion products, indoor environment in buildings, heating of buildings, hot water preparation, heat sources, ventilation and air conditioning systems, fundamentals of cooling systems, low and high voltage wiring in buildings, fundamentals of artificial lighting, lightning conductors.

Structural Mechanics - Loading of structures. Internal forces, stress states and deformation of bar structures in bending. Free torsion. Inelastic loading of members. Stability of straight members. Analysis of structurally indeterminate planar bar structures. Finite Element Method principles. Beam on an elastic base. Walls and slabs. Stress states of thin-walled members.

Concrete and masonry structures – Concrete technology - composition, production, properties and testing of concrete. Design of reinforced concrete members and structures - preliminary design, loading effects, computational models and methods, load-bearing capacity for basic loading cases (bending, shear, extruding, combinations of moment and normal forces, torsion), serviceability, design principles, reinforcement. Design principles of prestressed concrete members. Properties of masonry units, mortar, material properties of masonry, design of masonry elements to resist stress effects due to vertical and horizontal loads.

Steel and timber structures – Material properties of steel, production of steel structures, design of steel rods and joints. Composite steel-concrete structures. Protection against corrosion and fire. Steel structures of buildings and halls - typology, design of parts of structures, spatial rigidity. Properties of timber and wood-based materials, design of timber elements and connections, planar and spatial timber structures. Design to resist fire effects, protection from deterioration.

Geotechnics - Properties and classification of soils, engineering-geological survey, water in soil, stresses in soil, laboratory testing of soils, deformation characteristics of soils, consolidation, compaction, shear strength, earth pressure, slope stability, shallow foundations, deep foundations, construction pits and their securing.

Study programme: **Water and Environmental Engineering**

Hydraulics. Hydrostatic pressure and force. Pascal law and Archimedes law. Conservation of mass (continuity equation) and conservation of energy (Bernoulli equation). Flow in pressurized pipes (flow regimes, determination of energy losses). Open channel flow (flow regimes and types, rating curve calculation, uniform flow, Chezy equation). Hydraulic jump. Water hammer. Groundwater flow (Darcy law).

Hydrology. Basic hydrological and meteorological parameters. Statistical assessment of discharges. Rainfall-runoff relations. Flood wave transformation.

Water Management. Basic principles of water purification and wastewater treatment. Drinking water supply (water resources, intake systems, water processing plants, storage tanks, distribution systems). Wastewater discharge and treatment (types of wastewater, wastewater treatment plants, sewer systems and their parts).

Hydraulic Structures. Basics of design and operation, objects and technologies of the following structures: dams, weirs, channels, waterways. Water energy use (types of hydropower stations and their technologies). Flood control (types of flood protection structures, design discharges for flood protection structures).

Environmental Engineering. Hydropedology (physical properties of soil, hydrostatics and hydrodynamics of groundwater). Irrigation (irrigation parameters and structures, drought assessment). Water drainage (types of drainage structures and their basic parameters). Soil erosion in landscape (types of erosion and types of protective measures). Climate change (causes, environmental impacts, adaptive and reducing measures).

2nd November 2020

prof. Ing. Jiří Máca, CSc.
Dean