Annex to the Dean's Instruction 3/2024

TOPIC FIELD WITH EXAMINATION CIRCUITS (QUESTIONS) FOR MASTER'S DEGREE STUDY PROGRAMME *CIVIL ENGINEERING*

Update to 22. 3. 2024

Compulsory thematic heading – *Building Design*

1. Surface establishment of the structure. Minimum foundation depth. Foundation joint, purpose of foundations.
2. Deep foundation of the object. Design criteria, possible ways. The term foundation joint and the main function of the foundation.
3. Min. clear height of the space in the administrative building intended for permanent work according to NV 361/2007. Reduced minimum ground clearance according to ČSN, criteria for the use of reduced clear height.
4. Orientation of pitches and stands to the cardinal points on an example – a tennis court with one stand. Draw and describe the profile diagram of the stages in the auditorium.
5. Criteria for the design of the number of parking spaces for the new construction of an administrative building and the new construction of an apartment building according to ČSN 736110 and according to Proclamation 268/2009 Coll.
6. Structural systems of administrative buildings, internal division of administrative buildings.
7. Expressive means of the architecture of administrative buildings. Design options for facade solutions.
8. Waterproofing of a partially basement building. Material solutions, anchoring methods. Corner and return joint and the specifics of their design.
9. Waterproofing of a building with three underground floors. Material solutions, anchoring methods. Corner and return joint and the specifics of their design.
10. Possibilities of reducing hydrophysical stress in an object situated on a sloping terrain. The design of the floor of the living room above the surrounding landscaped area.
11. Possibilities of the design solution of the staircase in the object of the administrative building. Minimum dimensions of stair arms, their slopes and permissible dimensions of stair steps. Dimensions of stair treads.
12. Possibilities of the design solution of the staircase in the kindergarten building. The minimum dimensions of stair arms, their slopes and what are the permissible dimensions of stair steps. Dimensions of stair treads.
13. Barrier-free parking spaces, dimensions and slopes. Slopes of inclined ramps and semi-ramps in parking facilities.
14. Railings in the administrative building. The heights of the railings, the design of the railing filling elements, the distances between the railing fillings.
15. Railings in the kindergarten building. The heights of the railings, the design of the railing filling elements, the distances between the railing fillings.
16. Direct two-way outdoor ramps. Design criteria.
17. Parking at a public building, design conditions for the correct number of parking spaces. Short-term parking. K+R parking lot.
18. Design of the facade of the mountain hotel building from the point of view of climatic conditions and continuity with the layout.

19. OPENSPACE for administrative buildings. Layout and operational solutions, structural, material solutions, etc.
20. Design and diagram of a male/female toilet on a typical floor of an administrative building.
21. The floor in the kindergarten playroom. The game room is on the field. Floor layers, their functions.
22. The floor in the upstairs bathroom. Floor layers, their functions.
23. LOBBY BAR, GARNI HOTEL and OFFICE. Corridors in the hotel. Layout and operational solutions, structural, material solutions, etc.
24. Hygienic facilities at catering establishments, layout, technical and hygienic requirements.
25. Location and orientation of the residential building on the plot in the development. Distances from the boundaries of the land, from neighboring buildings and orientation to the cardinal points, distances from roads.
26. Composition of a flat roof of a residential building. Roof layers, their functions and design conditions. Slopes of roof planes. The main elements of a flat roof.
27. Composition of a sloping roof of a residential building. Roof layers, their functions and design conditions. Slopes of roof planes. The main elements of a pitched roof.
28. Rooms in an accommodation facility, minimum areas of rooms, smallest area of sanitary facilities. Partition walls in accommodation facilities.
29. Sizes of the football field, orientation to the cardinal points, main stand. Basic elements of a football pitch.
30. Structural systems of high-rise buildings. Specifics of the construction system.

Compulsory thematic heading – *Structural Detail, Fire Safety of Buildings and Saving and Building Adaptation*

1. Design solution of the detail of the roof drain. A solution for coating waterproofing. Types of roof gutters and their installation. Terms of the proposal.
2. Design solution of the attic detail. Solutions for coating waterproofing, design principles and assembly methods.
3. Safety elements of the roof. Terms of proposal, purpose of proposal, types.
4. Design solution of the detail in the place of the gutter and gutter.
5. Design solution of the ridge detail.
6. Design solution of the detail of the installation of the skylight.
7. Design solution of the connection joint of the filling of openings (doors, windows, etc.). Construction principles, position of the filling in the construction opening, construction physics.
8. Structural solution of the opening lintel detail (ordinary lintel, roller blind lintel, etc.). Structural design principles and assembly methods, building physics.
9. Construction solution of ventilated facade or ETICS. Structural principles of track design and assembly methods.
10. Structural solution of the waterproofing detail of the substructure at the point of penetration through the waterproofing. Solutions for asphalt and foil waterproofing, installation methods.
11. Solutions for escape routes in tenement houses.
12. Fire safety of buildings for housing and accommodation.
13. Fire safety solutions for health care facilities and social care buildings.

14. Specifics of fire safety solutions for assembly areas and building changes.
15. Requirements for the design and assessment of fire safety devices.
16. Design procedure and fire safety assessment of production facilities. Differences in the assessment of production and non-production objects.
17. Determination of fire risk for production facilities. Fire sections and areas without fire risk.
18. Escape routes at production facilities. Types, numbers, sizing, design.
19. Stand-off distances, distances from open warehouses. Construction technical equipment. Equipment for fire fighting.
20. Assessment of garages. Requirements for collective garages and stacker garage systems.
21. Fire safety of warehouse buildings. Spaces with flammable liquids.
22. Assessment of fire safety of objects for agricultural production and connection objects.
23. Causes of damp masonry of building objects.
24. Methods of measuring humidity in building structures.
25. Modern mechanical rehabilitation methods. Advantages and disadvantages of individual methods and the methods and conditions of their implementation.
26. Methods of infusion screens of masonry rehabilitation.
27. Electrophysical methods of remediation of masonry moisture.
28. Moisture remediation methods based on airflow, remedial plasters.
29. Ways of protecting existing and modernized buildings against the penetration of radon from the subsoil.
30. Protection of building objects against biological agents. Solution methods and tools used.

Compulsory thematic heading – *Building Physics*

1. Thermal technical requirements for the envelope of buildings with almost zero energy consumption.
2. Types of thermal insulation and their use in building structures.
3. Principles of building design with regard to transparent structures, orientation to the cardinal points.
4. Principles of layout design, thermal zoning of the building.
5. Thermal bonds and thermal bridges of structures, definitions, requirements and method of calculation.
6. Requirements for the energy efficiency of buildings with almost zero energy consumption.
7. Differences between passive houses and buildings with almost zero consumption.
8. Types of heat gains in buildings and their usability.
9. Construction of opening filling, materials and methods of glazing.
10. Physical parameters of glazing from a thermal and light technical point of view.
11. Gaining energy from renewable sources and their processing in buildings.
12. Summer overheating of buildings and possibilities to reduce the risk of overheating.
13. Controlled ventilation, air intake and exhaust from rooms.
14. Low-temperature heating, design, heat distribution.
15. Methods of heating in low-energy buildings.
16. Heating systems in terms of thermal comfort and energy savings.
17. Advantages and disadvantages of local and central ventilation units.

18. Heat recovery from waste air. Types of heat exchangers.
19. Airtightness of the building and its influence on the energy efficiency of buildings.
20. Airtightness requirements. Airtightness measurement method.
21. The most common air leaks in the building envelope and the possibilities of correction.
22. Renewable energy sources and their integration into the heating system.
23. Renewable energy sources for hot water preparation.
24. Energy performance of the building and contents of the envelope label.
25. Energy efficiency of the building and content of the building certificate.
26. Cogeneration as an energy source, technical solutions and use.
27. Energy conversion factor, what matters, values for energy carriers.
28. Heat pump, principle, types, use.
29. Heat pump heating factor, what values it takes, types.