ENGINEERING DIPLOMA EXAMINATION ARCHITECTURE

SCOPE OF EXAM ISSUES

HISTORY OF ARCHITECTURE AND URBAN PLANNING

1. Architecture of ancient Greece and Rome: types of buildings, materials and construction methods, principles of composition.
2. Early Christian architecture: construction traditions, functional and structural solutions - longitudinal and central projection.
3. Romanesque architecture in Europe and in Poland; schools, spatial and material layouts.
4. The gothic cathedral as a symbol of the spiritual life of the era and a structural experiment.
5. Gothic architecture in Poland: the sources of inspiration of architectural concepts and the impact of climate on architecture - examples.
6. Florence - works of early and late masters of Italian Renaissance architecture.
7. Renaissance in Poland: Wawel, palaces of magnates and houses of burghers.
8. The Italian Baroque - shaping the interior space and the dynamics of architectural forms - architects and their works.
9. Baroque churches in Poland. Investors, inspirations and opportunities.
10. Classicism in France.
11. Classicism in Poland: patronage of the royal court (Merlini, Kamsetzer, Corazzi).
12. Art nouveau, jugendstijl, arts & crafts movement, stile floreale - protest against what?
13. Deutsche Werkbund and Bauhaus - similarities and differences; creators.
14. Modernism - ideological assumptions, trends, examples, creators.
15. Le Corbusier - ideas and projects.
16. Postmodernism as the philosophy of rebellion, its features and trends, creators and their works.
17. Hi-tech - genesis, the most important works and their creators.
18. Urbanism XIX: changes in old city centers (Vienna, Kraków, Poznań)
19. New trends in urban planning in the 20th century: "Athens Charter" and its spatial effects on cities.
20. List and discuss elements that are part of the cultural heritage.
21. Definition of a monument. Types and forms of protection.
22. Conservation and the restoration of monuments. Aims and principles of conservation practice.
23. Eugène Emmanuel Viollet-le-Duc - doctrine, rules of conduct and conservation achievements.
24. The conservation doctrine of Alois Riegl and the criteria for the classification of monuments.
25. Main doctrinal principles of the post-war reconstruction of Polish cities according to Jan Zachwatowicz.
26. The Venice Charter of 1964 and the resulting main principles of conservation.
27. The spatial development of Poznań from the Middle Ages to the present day.

ART-COLOR, LIGHT - THE RELATIONSHIPS BETWEEN THE FINE ARTS AND ARCHITECTURE

1. Organic and mineral painting techniques. Basic differences between easel and wall painting.
2. Types of perspectives, their features and application.
3. Types of painting compositions and genres?
4. The division of colors and the principles of mixing them.
5. Main trends and styles in painting which have a decisive influence on changes in the 20th-century art (Impressionism, Cubism, Expressionism).
6. Architectural motifs in paintings, drawings, graphics and sculptures, and paintings in architectural space - tendencies, examples, creators.

7. Sculptural and architectural form - similarities and differences.
8. Color in painting versus color in architecture - what is the meaning of color in painting and what can / does it have in architecture and urban planning.
9. Space in drawing and painting - examples (types of perspectives).

ARCHITECTURAL DESIGN

1. Single-family housing architecture.
2. Multi-family residential architecture.
3. Organic house architecture.
4. Connections between architecture and technology. Architecture of energy-efficient houses.
5. Local land management plans and land development decisions as design guidelines.
6. Organization of the investment process and the specificity of architectural design.
7. Systems of proportion in architecture.
8. Tendencies in architectural composition described by Juliusz Żórawski.
9. Ergonomics in architectural design. Genesis and principles.
10. Principles of universal design. List and characterize briefly.
11. Accessibility of public facilities. Discuss the types of accessibility you know, give examples.
12. Stairs in a single-family residential building: ergonomics and applicable regulations.
13. The height of the room. Discuss the parameters and determinants.
14. Plot development plan: ground level and ground floor level. Explain the designation rules.

HOUSE BUILDING AND CIVIL ENGINEERING STRUCTURES WITHIN THE SCOPE OF CIVIL ENGINEERING

1. Basic construction systems of buildings.
2. Foundations: general characteristics, types, levels and depths of foundations.
3. Walls in buildings: types, materials, types of bonds, wall thickness.
4. Types of ceilings in buildings. Balcony slabs.
5. Flat roofs: types, structure, layering, roof drainage.
6. Wooden roof structures: types, roof truss elements, spans.
7. Insulation in buildings: types, classification, conditions of use.
8. Basic principles of technical drawing: markings, dimensioning, lines.
9. Typization and prefabrication in construction: a building module.
10. Finishing elements of buildings: plasters, floors, floors.
11. Thermal insulation of buildings: methods, materials, layer thicknesses.
12. Wooden structures: foundations, walls, roof (types, elements).
13. Interior doors. Principles of dimensioning in the light of the frame and the opening in the wall, ways and directions of opening.

URBAN PLANNING

1. Definitions and conceptual scope of urban planning, urbanization, spatial development, and urban planning concepts.
2. Basic elements of urban layout and structure - typology and characteristics of urban interiors.
3. Elements of urban composition according to the theory of flagship researchers on this issue.
4. Housing development as a basic urban material.
5. Spatial structure of the city and its changes throughout history.
6. Contemporary urban doctrines - the Athens Charter, the New Athens Charter (sustainable development), the Charter of the New Urbanism.
7. Characteristics of the basic elements that define urban space - square, street, quarter.
8. Issues, elements and methodological basis of the theory of urban design.
9. Basic instruments and tools for urban design.
10. Elements and parameters for shaping the urban complex.
11. Structure of the building-up of an area and its individual functions.
12. Parameters and types of green spaces and communication in the city structure and housing estate structure.
13. Basic assumptions of the city plan.

14. Urban indicators.
15. The urban composition of the identity of the place and natural forms.

RURAL PLANNING, GREENERY

1. Name and discuss the shapes of rural settlements.
2. Spatial systems of buildings in specialist rural farms.
3. Name and discuss functional parts of the manorial and court estates.
4. Classification of urban green areas.
5. List the characteristics of the Renaissance and Baroque gardens (plant material, landscaping elements). Provide examples.
6. Enumerate the characteristics of English parks, romantic and naturalistic gardens. Provide examples.
7. Discuss the process of greenery design in open spaces.
8. Factors affecting the spatial and artistic planning of the park.
9. Functions of urban greenery.
10. Definitions, typology and classification of landscapes.
11. Perception and principles of shaping landscape interiors
12. Methods of landscape inventory, analysis and valorization
13. The role of landscape in shaping the urban environment, climate and water resources
14. Theories of landscape perception and the use of selected methods and tools (eg cognitive maps).
15. Landscape development and protection tools and legal bases for landscape management in Poland.

RECREATION

1. Structure of recreational development in agglomerations.
2. Origins and development of recreational functions in urban planning.
3. Evolution of sports and recreation facilities from antiquity to the present day.
4. Principles of designing sports halls
5. Principles of designing indoor swimming pools
6. Typology and distribution of recreational areas and facilities in the city.
7. Factors determining the suitability of areas for recreational functions.
8. Recreational development of urban water areas.

MECHANICS OF BUILDING, CIVIL ENGINEERING AND BUILDING CONSTRUCTIONS, BUILDING PHYSICS, ACOUSTICS, ENERGY-SAVING CONSTRUCTION

1. Strength characteristics of basic construction materials.
2. Acoustic comfort of rooms - requirements depending on the function of the room.
3. The influence of interior design, cubature and finishing materials on acoustics.
4. Protection against noise.
5. Requirements for thermal insulation of walls, floors and flat roofs in buildings intended for human occupancy.
6. Energy savings and thermal performance in buildings.
7. Heat transfer coefficient "U" for space dividing elements - definition and calculation method.
8. Heating devices in buildings. Conventional and alternative energy sources.
9. Rules for ventilation of rooms in residential buildings.
10. Dimensional coordination in construction. Building module.
11. Types of foundations, general characteristics, depth of foundation in buildings.
12. Methods of laying bricks in walls (brick bonding), thickness of brick walls. Curtain walls.
13. Reinforced concrete in ceiling structures. The advantages and disadvantages of reinforced concrete, the basis for designing the thickness of reinforced concrete ceiling.
14. Wood in covering structures, advantages and disadvantages. Roof trusses – types
15. Smart building. Definition, building management system (basic elements of the system and their functions), with particular emphasis on energy savings.
16. Smart city. Definition, basic characteristic.
17. Renewable energy sources. Definition, types. Ways of using renewable energy in architecture.

18. Present the conditions of equilibrium for statically determinate systems. Discuss principles of calculating reactions in statically determinate systems. Specify types of external forces acting on the construction system.
19. Discuss methods of truss analysis – methods of joints and method of sections.
20. Present types of internal forces of beams and frames, define each of them and explain sign convention of internal forces. Characterise normal stress. Characterise shear stress.
21. Explain pure bending of beams. Describe the phenomenon of column eccentricity. Provide the definition of the core of a section. Discuss elastic and non-elastic buckling of columns. Present the manner of determining the degree of static indeterminacy.
22. Discuss the method of forces.
23. Energy-efficient building. Definition, basic principles of design

BUILDING PHYSICS - LIGHTING, LIGHTING DESIGN AND ELECTRICAL INSTALLATIONS

1. Criteria and principles of lighting.
2. Lighting equipment - lighting fittings.
3. Lighting equipment - light sources.
4. Illumination of architectural objects.

FIRE SAFETY

1. Fire safety - basic terminology.
2. Categories of hazards for people and fire zones in residential buildings.
3. Escape and fire routes in residential buildings.
4. Fire protection requirements for doors and staircases.
5. Fire resistance in residential buildings.
6. Location of buildings (due to fire safety in residential buildings).
7. Parameters of vertical and horizontal communication in buildings: corridors, stairs, elevators. Evacuation in residential buildings.

MATERIALS

1. Thermal insulation.
2. Stone for construction.
3. Ceramic materials.
4. Steel products.

COMPUTER DESIGN SUPPORT

1. GIS systems, definition of the concept, application in urban planning, architecture and spatial planning.
2. Direct and parametric modeling. Advantages and disadvantages in the context of creativity and efficiency, application in architectural design, software examples.
3. BIM as a design tool and method in construction and architecture. BIM 3D-8D
4. Analytical possibilities with the use of BIM systems in architectural design.
5. Cross-design industry coordination using BIM. IFC format. The role of the BIM manager.
6. Basic methods of three-dimensional scanning, application, the concept of point clouds.
7. CAD, BIM, CAM. Definition of terms, the process from design to digital fabrication of a building, fabrication methods.
8. The role of visualization, including VR and AR from design to construction site.