MASTERS DIPLOMA EXAMINATION – cycle of study 2
Field of study: Civil Engineering

TOPICS and list of EXAMINERS
in academic year 2021/2022

Department of General Civil Engineering

THEMATIC BLOCK: General Civil Engineering

EXAMINERS:

1. Prof. Dr Paweł Sikora pawel.sikora@zut.edu.pl
2. visiting professor
3. Dr Rafał Nowak rnowak@zut.edu.pl
4. Dr Szymon Skibicki szymon.skibicki@zut.edu.pl

TOPICS FOR MASTERS DIPLOMA EXAMINATION

1. Describe the cracks influence on masonry structure. Discuss the types of crack, causes and repairing methods.
2. Characterize the diagnostic methods for masonry structures.
3. Describe the rules for determining masonry structures material properties
4. Describe the rules / requirements for masonry partition wall design
5. Describe the rules / requirements for masonry wall design
6. Describe the rules / requirements for timber roof truss construction and design
7. Describe the rules for timber portal frame structure design
8. Describe the rules for tapered and double-tapered glulam beam design according to BS-EN 1995-1-1
9. Describe the rules for roof and wall purlins design according to BS-EN 1995-1-1
10. Describe the rules for timber structure elements design according to BS-EN 1995-1-1
11. Describe the rules for timber connection design according to BS-EN 1995-1-1
12. How to design timber structure bracing? Describe the rules and requirements for construction and design according to BS-EN 1995-1-1
13. Discuss the similarities and differences between rules for solid and glulam timber design (according to BS-EN 1995-1-1)
14. Describe the rules / requirements for timber structure strengthening selecting and design.
15. Describe the requirements for masonry spatial bracing design.

MASTERS DIPLOMA EXAMINATION – cycle of study 2
Field of study: Civil Engineering

TOPICS and list of EXAMINERS
in academic year 2021/2022

Department of General Civil Engineering

THEMATIC BLOCK: Management in Civil Engineering

EXAMINERS:

1. Prof. Dr Paweł Sikora pawel.sikora@zut.edu.pl
2. Dr Magdalena Bochenek magdalena.bochenek@zut.edu.pl
3. Dr Agnieszka Siewiera agnieszka.siewiera@zut.edu.pl

TOPICS FOR MASTERS DIPLOMA EXAMINATION

1. Please explain what actions should be taken by the Contractor when unforeseen physical conditions are encountered during the execution of works and who is responsible for the consequences of delays and costs according to FIDIC Contract Conditions (Red Book).
2. Please discuss what should the programme contain based on FIDIC Contract Conditions (Red book).
3. Please discuss the methods for assessing the profitability of investments (static and dynamic).
4. Please discuss the basic discount indicators for assessing the economic profitability of an investment: NPV (net present value) and IRR (internal rate of return).
5. Please explain the application of an Ishikawa diagram and discuss the steps in creating a cause and effect diagram.
6. Please discuss selected tools and techniques used in quality management.
7. Please explain what the Program Evaluation and Review Technique (PERT) is.
8. Please discuss the differences between project management according to PRINCE2 and PMI methodology.
9. Please explain who part of Project Board is and discuss the tasks of Project Board in the PRINCE2 methodology.
10. Please discuss the principles of managing significant and non-significant changes during construction works.
11. Please explain what Earned Value method is and its application in the in construction process.
12. Please discuss methods of risk elimination and minimisation in construction projects.
13. Please discuss the types of construction contracts.
14. Please discuss methods of planning construction works - critical path method and network diagram methods.

MASTERS DIPLOMA EXAMINATION – cycle of study 2
Field of study: Civil Engineering

TOPICS and list of EXAMINERS
in academic year 2021/2022

Department of Building Physics and Construction Materials

THEMATIC BLOCK: Technology of building materials and building physics

EXAMINERS:

1. Prof. Dr. Teresa Rucińska — Teresa.rucinska@zut.edu.pl
2. visiting professor
3. Dr Karolina Kurtz-Orecka — karolina.kurtz@zut.edu.pl
4. Dr Jarosław Strzałkowski — jaroslaw.strzalkowski@zut.edu.pl
5. Dr Agata Stolarska — agata.siwinska@zut.edu.pl

TOPICS FOR MASTERS DIPLOMA EXAMINATION

1. Describe the properties of building materials related to their durability.
2. On the example of autoclaved aerated concrete and silicate products, discuss the differences in the hygrothermal properties of vertical building components.
3. Discuss the parameters describing the porous structure of building materials, describe the research methods for determining the porosity of materials.
4. Discuss the infrared diagnostics of building components, present the principles of measurements, advantages and limitations of the method.
5. Present the topic of airtightness of building, discuss the requirements and testing methods.
6. Discuss the possibilities of improving the building's energy performance in relation to the existing and planned buildings.
7. Discuss the influence of thermal and air bridges on the thermal performance of buildings and the possibility of reducing their negative impacts.
8. Discuss the influence of the shape and structure of the window on its thermal transmittance.
9. Discuss phase-changing materials, list examples of their use in construction.
10. Define potential sources of moisture in building components and discuss their negative impact.
11. Characterize the structure and the mode of action of transparent insulations on specific examples.
12. Discuss the examples of application of recycling building materials.
13. Discuss the influence of the conditions of the care of cement products on drying shrinkage.
14. Discuss the elements of the building's heat balance.
15. Present detailed thermal and humidity requirements as well as energy savings specified in technical and construction regulations.

MASTERS DIPLOMA EXAMINATION – cycle of study 2
Field of study: Civil Engineering

TOPICS and list of EXAMINERS
in academic year 2021/2022

Department of Theory of Structures – Division of Steel Structures

THEMATIC BLOCK: Metal structures

EXAMINERS:

1. Prof. Dr Tomasz Wróblewski wroblewski@zut.edu.
2. Dr Małgorzata Abramowicz mabramowicz@zut.ed
3. Dr Małgorzata Jarosińska jarosinska@zut.edu.pl
4. Dr Wiesław Paczkowski wespa@zut.edu.pl
5. Dr Agnieszka Pełka-Sawenko aps@zut.edu.pl
6. Dr Piotr Popiel pp@zut.edu.pl

TOPICS FOR MASTERS DIPLOMA EXAMINATION

1. List and generally characterize the so-called sheet steel structures.
2. List the loads acting on steel chimneys and discuss the principles of dimensioning their structural shells.
3. List the loads acting on ground steel tanks and discuss the general principles of their dimensioning and construction.
4. Discuss the basic structural systems used in steel halls.
5. Compare the rules concerning the bracing systems of steel halls and crane trestles.
6. Present the known methods of connecting a steel beam (transom) with a steel column and the principles of their use in terms of construction and technology.
7. List the types of steel gantry girders and present the main principles of their construction.
8. Discuss the principles of dimensioning a plate gantry girder.
9. Discuss the types of steel roofs with large spans.
10. List and generally discuss the non-ductile forms of damage of steel structures as well as construction and material procedures preventing their occurrence.
11. Discuss the general effect of residual stresses on the bearing capacity of steel elements.
12. Discuss the idea of global plastic analysis of steel structures.

MASTERS DIPLOMA EXAMINATION – cycle of study 2
Field of study: Civil Engineering

TOPICS and list of EXAMINERS
in academic year 2021/2022

Department of Theory of Structures – Division of Structural Mechanics

THEMATIC BLOCK: Theory of Structures

EXAMINERS:

1. Prof. Dr Radosław Iwankiewicz iwankiewicz@tu-harburg.de
2. Dr Anna Jabłonka anna.jablonka@zut.edu.pl
3. Dr Ewa Silicka ewa.silicka@zut.edu.pl
4. Dr Adrian Silicki adrian.silicki@zut.edu.pl
5. Dr Piotr Szewczyk szewczyk@zut.edu.pl
6. Dr Hanna Weber weber@zut.edu.pl

TOPICS FOR MASTERS DIPLOMA EXAMINATION

1. Discuss the problem of vibrations of structural systems with single degree of freedom
2. Discuss the problem of vibrations of discrete structural systems with N degrees of freedom
3. Discuss the most popular methods of structural reliability analysis
4. Discuss the problem of stability and buckling phenomenon in structural systems
5. Explain the Cauchy's equations in accordance with the relation between strain and displacement components in 3D structures
6. Discuss the theoretical assumptions and computational models considered in the plane state of stress and plane state of strains
7. Discuss the simplifying assumptions taken into account in the theory of plates; write and explain the plate differential equation
8. Discuss the Huber – Mises hypothesis in accordance with 3D structures
9. Discuss the problem of the beam on elastic foundation and the corresponding equations of finite difference method
10. Discuss the limit state analysis of continuous beams and kinematic method
11. Discuss basic theses of thin–walls sections analysis and the differential equation of twisting angle
12. Discuss basic theses of thin–walls sections analysis, boundary conditions and differential relations between internal forces, warping and the angle of twist
13. Present the empirical methods of measurements of forces, displacements, strains and vibrations in structural systems

MASTERS DIPLOMA EXAMINATION – cycle of study 2
Field of study: Civil Engineering

TOPICS and list of EXAMINERS
in academic year 2021/2022

Department of Geotechnical Engineering

THEMATIC BLOCK: Geotechnical Engineering

EXAMINERS:

1. Prof. Dr Zygmunt Meyer meyer@zut.edu.pl
2. Dr Roman Bednarek bednarek@zut.edu.pl
3. Dr Tomasz Kozłowski tom.kozl@zut.edu.pl
4. Dr Andrzej Pozlewicz andpoz@zut.edu.pl
5. Dr Krzysztof Żarkiewicz kzarkiewicz@zut.edu.pl

TOPICS FOR MASTERS DIPLOMA EXAMINATION

1. Using computer packages for solving of geotechnical problems
2. Field investigations of soil and their application in analysing of geotechnical issues CPTU sounding and static load test
3. Mechanically stabilized earth walls and reinforced soil slopes design and construction
4. Improvement of soft soil
5. Piles bearing capacity. Failure mechanism for loaded piles
6. Large diameter plate, pile foundation
7. TBM and NATM methods in construction of transportation tunnels
8. Tunnel equipment, ventilation and fire protection
9. Diaphragm walls design in deep excavations and in urban area

MASTERS DIPLOMA EXAMINATION – cycle of study 2
Field of study: Civil Engineering

TOPICS and list of EXAMINERS
in academic year 2021/2022

Department of Reinforced Structures and Concrete Technology

THEMATIC BLOCK: Concrete Structures

EXAMINERS:

1. Prof. Dr Elżbieta Horszczaruk elzbieta.horszczaruk@zut.edu.pl
2. Dr Piotr Brzozowski piotr.brzozowski@zut.edu.pl
3. Dr Norbert Olczyk norbert.olczyk@zut.edu.pl
4. Dr Adam Zieliński adam.zielinski@zut.edu.pl

TOPICS FOR MASTERS DIPLOMA EXAMINATION

1. Purpose of prestressing/post-tensioning of concrete and types of prestressed/post-tensioned concrete structures
2. Properties of materials used in prestressed/post-tensioned structures
3. Methods of prestressing and post-tensioning concrete structures and related design requirements
4. Limit states of prestressed/post-tensioned structures - scope and methods of analysis
5. Instantaneous and long-term prestressing losses in prestressed and post-tensioned concrete structures
6. Tendons placement in the cross-section of prestressed structures
7. Design solutions for tendon anchorage and concrete reinforcement in the tendon anchorage zone
8. Types of reinforced concrete arches, static schemes and related structural solutions. Statics of arches and principles of their dimensioning
9. Types of rectangular tanks. Methods of static analysis depending on geometric dimensions. Design of reinforcement distribution in rectangular tanks depending on their geometric dimensions.
10. Static analysis of cylindrical tanks for liquids. Static schemes - Membrane condition and boundary disturbances
11. Shell covers. Hemispherical and cylindrical shells. Statics, distribution of internal forces. Shaping of shell reinforcement.
12. Silos and bunkers. Static analysis. Forming of reinforcement of bunkers and silos.
13. Thin-wall elements, stress distribution depending on type of load. Methods of dimensioning and shaping of reinforcement
14. Methods of reinforcing reinforced concrete structures - active and passive. Reinforcement of bending and shear sections of reinforced concrete structures
15. Durability and maintenance of reinforced concrete structures. Diagnostics, technical condition assessment, repair methods

MASTERS DIPLOMA EXAMINATION – cycle of study 2
Field of study: Civil Engineering

TOPICS and list of EXAMINERS
in academic year 2021/2022

Department of Reinforced Structures and Concrete Technology

THEMATIC BLOCK: Concrete Technology

EXAMINERS:

1. Prof. Dr Maria Kaszyńska maria.kaszynska@zut.edu.pl
2. Dr Piotr Brzozowski piotr.brzozowski@zut.edu.pl
3. Dr Norbert Olczyk norbert.olczyk@zut.edu.pl
4. Dr Adam Zieliński adam.zielinski@zut.edu.pl

TOPICS FOR MASTERS DIPLOMA EXAMINATION

1. Determine the characteristics of high performance concretes and their advantages
2. What are the differences in the composition of ordinary (OC), high performance (HPC) and ultra-high performance concretes (UHPC)?
3. What are superplasticizers? What is the mechanism of their work? State the two most important effects of superplasticizer?
4. What mineral additives are used in new generation concretes, what are their properties?
5. Regarding ultra-high performance concretes, how should you change the maximum aggregate size to increase the strength of concrete? What is the W/C ratio of these concretes?
6. What are the basic properties of self-consolidating concretes (SCC)? Describe the test methods used to determine the rheological properties of these concretes
7. Give 4 characteristics of SCC that are the basis for the classification of these concretes
8. What is the weakest component in ordinary concretes and what in HPC?
9. Which of the 3 equations from the classical design of ordinary concretes can be applied to HPC and which cannot and why?
10. What aggregate is used in lightweight high performance concretes? Give examples of structures that use those concretes?
11. Characterize architectural concretes. What are the major problems in obtaining suitable characteristics of these concretes?
12. What are polymer concretes?
13. Describe the characteristics of fiber reinforced concretes.
14. Discuss the methods of shotcrete
15. What are the development trends in the technology of new generation concretes?

MASTERS DIPLOMA EXAMINATION – cycle of study 2
Field of study: Civil Engineering

TOPICS and list of EXAMINERS
in academic year 2021/2022

Department of Roads and Bridges Engineering

Department of Theory of Structures

INTERDISCIPLINARY BLOCK: Basics of Bridge Engineering

EXAMINERS:

1. Prof. Dr Tomasz Wróblewski wroblewski@zut.edu.plu.pl
2. Dr Małgorzata Abramowicz mabramowicz@zut.edu.pl
3. Dr Janusz Hołowaty janusz.holowaty@zut.edu.pl
4. Dr Stanisław Majer stanislaw.majer@zut.edu.pl
5. Dr Agnieszka Pełka-Sawenko aps@zut.edu.pl
6. Dr Piotr Popiel pp@zut.edu.pl

TOPICS FOR MASTERS DIPLOMA EXAMINATION

1. Describe the concrete slab decks according to their aspect ratio l_1 / l_2
2. Describe the basic types of composite steel-concrete bridges
3. Define a clear span of a bridge and conditions for its estimation
4. Discuss the types of concrete bridges
5. Discuss the types of steel bridges
6. Discuss the types of composite steel-concrete bridges
7. Discuss the types of arch and frame bridges
8. Discuss the basic parameters of structural concrete for bridge structures: minimum concrete grades and minimum deck slab depths (Highways Agency Poland specifications)
9. Characterize the structural steels for bridges
10. Discuss the construction methods for cast in-situ concrete bridges
11. Describe decisive conditions for the concrete slab bridge depth estimation
12. Discuss structural solutions in cable stayed bridges
13. Present basic types of bridge structures (bridges, viaducts, flyovers and culverts) and draw their structural schemes
14. Discuss a notation of a bridge service width
15. Discuss the bridge division according to a span type (beam, truss, slab, arch, frame, cable-stayed, suspension)
16. Discuss the assumptions for bending resistance calculation of reinforced concrete members in bridges
17. Describe the rules for the shear reinforcement calculation in bridge beams
18. Describe the EC2 general rules and requirements for crack control
19. Describe the EC2 general rules and requirements for deflection control