



DEAN

Questions for the entrance exam of MSc in Computational Structural Engineering

Structural Analysis (BMEEOTMAS05)

1. Definition of influence lines. Influence lines of reactions and internal forces of statically determinate structures by statical considerations and by the principle of virtual displacements. Demonstration through a continuous beam with hinges (Gerber type beam).
2. Influence lines of displacements of statically determinate structures by the Maxwell Theorem. Demonstration through a continuous beam with hinges (Gerber type beam).
3. Analysis of statically indeterminate structures for standing loads by the force method. Principle of the force method, primary structure. Physical interpretation of the flexibility coefficients, load coefficients, and the canonical equations. Demonstration through a beam with three supports.
4. Influence lines of statically indeterminate structures by the force method. Primary structure. Influence lines of the load coefficients, and the physical interpretation of the canonical equations in the case of moving loads. Demonstration through a beam with three supports.
5. Analysis of statically indeterminate structures by the displacement method. Principle of the displacement method, primary structure. Physical interpretation of the stiffness coefficients, load coefficients, and the canonical equations. Demonstration through a simple sidesway frame.

Finite element modelling (BMEEOTMAS06)

1. Derive the boundary-value problem in the case of axially loaded beam. Give an example of the solution strategy by the use of the displacement method.
2. Derive the boundary-value problem in the case of classical beam. Give an example of the solution strategy by the use of the displacement method.
3. What is the Ritz-method? Give an example of this solution strategy by the use of a simple classical beam problem.
4. What are the main steps of Finite Element Method? (Write down and explain the mathematical formulations, as well.)

Steel Structures II. (BMEEOHSAS07)

1. Explanation the effective cross-section method of EC3, used for the design of class 4 cross-sections. Demonstration of the effective cross-section on I-section for pure compression and bending.
2. The local plate buckling phenomenon of girders under bending. Parameters having influence on the local buckling phenomenon in accordance of the EC3 design method.
3. The steps of the strength check of a steel column under combined compression and bending; calculation methods of the cross-sectional resistance by EC3.
4. Give the structural arrangement of a bolted, end-plate type, moment resistant beam-to-column joint (figure) and demonstrate the EC3 component method design concept!

Reinforced Concrete Structures II. (BMEEOHSAS08)

1. Reinforcing methods of two-way-RC slabs, calculation of reinforcement and structural arrangements.
2. Preliminary structural analysis of frame structures (typical, rectangular systems) for vertical and horizontal loads.
3. Calculation of prestressed RC girders for axial internal forces under uncracked and ultimate limit state conditions.
4. The behaviour of the end of RC beams, local checking of the supporting region, determination and arrangement of the reinforcement.

Bridge Construction (BMEEOHSAS09)

1. Describe the structural systems used in bridge design and their application fields.
2. Types and structural layouts of the bridge substructures (piers).
3. Describe the longitudinal and lateral structural system of the steel railway girder bridges, their deck systems and erection techniques.
4. Summarize the longitudinal and lateral structural system of the steel highway girder bridges, their deck systems and erection techniques.

Underground structures, deep foundation (BMEEOGTAS11)

1. Determination of the bearing capacity of piles.
2. Write about diaphragm walls (technology, bearing capacity, application cases).
3. Describe the technology and the machinery involved in pipe jacking. The function and operation of the intermediate jacking station.
4. Describe the construction methods and technologies, depending on size and soil, involved in the shot concrete tunnelling method (New Austrian Tunnelling Method). (Work methods.)

