Reinforced Concrete

Preparatory question for the theoretical part of the exam

Why can concrete and steel be used together in an advantegeous way ?

$\sigma-\varepsilon$ relationships of concrete: obtained in test and idealized (simplified)

$\sigma-\varepsilon$ relationships of reinforcement: obtained in test and idealized (simplified)

What is the difference between characteristic strength and design strength?

What is the difference between uniaxial strength and biaxial compression strength of concrete?

By what characteristics does the concrete modulus of elasticity depend from?

What is shrinkage of concrete, what are the consequences of shrinkage, how can shrinkage be reduced, what is the final value of it?

What is the fundamental difference between mild steel and hard-drawn steel?

What characteristics does the anchorage length of steel bars in concrete depend from?

 How can the anchorage length be influenced (reduced)?

What dimensions does is the effective length of rc beams depend from?

What are the different functions of links (stirrups) in rc beams?

Equilibrium conditions of rectangular sections subjected to flexure

Equilibrium conditions of rectangular sections subjected to flexure in case of doubly reinforced sections

Why used to be limited the height of the compression zone in $\xi_{co}d$?

What is the reason of limiting the area of the tension reinforcement in $A_{s,min}$?

What is the reason of limiting the area of the reinforcement in $A_{s,max}$?

Principles of realization of the necessary steel area

Why can be considered the effective width of flanged beams wider than the web width?

What is the modular ratio?

How do You determine the maximum stress in the concrete in uncracked state?

How do You determine the steel stress of a cracked rc section ?

How do You determine the moment of inertia of the uncracked rc section?

How do You determine the moment of inertia of the cracked rc section?

Draw the moment-curvature relationship of an rc beam section!

Draw the moment-steel percentage relationship of an rc beams cross-section!

What is the reason of the plastic moment redistribution in rc beams and slabs? Demonstrate it by figures!

How do You determine the curvature of cracked rc sections?

Show the way of application of the determination of moments by taking into consideration the plastic moment redistribution in continuous rc beams!

How can the effect of plastic moment redistribution be characterized in continuous rc beams?

What conditions should be checked by the application of the method of plastic moment redistribution incontinuous rc beams?

Sketch the elements of the reinforcement system of a continuous rc beam!

Why deformations (deflections) should be limited and what is the limit?

What is the limit of the deflection at the end of a cantilever?

For what value of the loads should the limit of deflection be investigated?

What is flxural rigidity and is it depending from?

What is slenderness ratio and what is the mean value of it, that is characteristic for rc beams and one-way slabs!

What is the effect of uncracked concrete between cracks on the maximum deflection?

Sketch steps of the simplified check of deflections!

Different reasons of cracking

What is the relationship between cracking and distance between dilatation joints?

Show characteristic crack patterns of some structural members: cantilever, simply supported beam, continuous beam!

What do the limits of the crack width depend from? What are the limits itself?

How do You make the simplified check of the crack width?

How can excessive cracks widths be restored?

What are the most important characteristics the crack width is depending from?

How does the steel stress, the bar diameter and the tension steel ratio influence the crack width?

Ways of modeling shear transfer in rc beams: the truss model of Mörsch and the tied arch model

Absorbing shear in uncracked state

Ways of absorbing shear in cracked state

The maximum shear capacity limited by the compression strength of the concrete

Design condition of the shear capacity

The practical way of shear design

The short cantilever

The way of checking of the beam end

Reduction of the anchorage length by 90º bents and hooks

Reason and extent of the parallel shifting of the moment diagram

Constructional rules of links and bent-up bars

Shear transmitted by diagonal compression to the support

The behaviour of rc beams subjected to torsion

Characterize the reinforcement designed for torsion in beams with rectangular section!

The method of Marcus used for the calculation of two-way slabs

The character of the moment distribution caused by impeding lifting of the corners of two-way slabs

The definition and characterization of yield lines of two-way slabs

Moment distribution in rectangular two-way slabs determined by the yield line theory

Yield line patterns of rectangular and trapezoidal slab panels by different support conditions

The method of substitutive strips used for the approximate analysis of flat slabs

Elements of the flexural reinforcement system of flat slabs

Design problem of the perimeter of flat slabs

The way of shear investigation of the column head of flat slabs along perimeters u_o. u_1 and u_{out}

Different types of the shear reinforcement used in column heads of flat slabs