

# Introduction to Laboratory Exercises and Review of Basic Knowledge

I

Teacher:

## PART A

1. How is the density of a regular ceramic product (e.g., solid masonry unit) calculated? Provide the equation, describe the individual variables, and their units.

2. How is the density of a ceramic shard (determined by hydrostatic weighing) calculated? Provide the equation, describe the individual variables, and their units.

3. How is the moisture content of a ceramic shard calculated? Provide the equation, describe the individual variables, and their units.

## PART B

1. What material is indicated by the designation C 30/37 XC2 XF3 D<sub>max</sub> 16 mm S4 Cl 0,2? Explain the individual parts of the designation.

2. What are the basic standard specimens for concrete testing (including dimensions)?

3. How is the compressive strength of concrete calculated? Provide the equation, describe the individual variables, and their units.

4. How is the flexural strength of concrete calculated (the reference test is a four-point bending test)? Provide the equation, describe the individual variables, and their units.

5. What material is indicated by the designation CEM I 42.5 R? Explain the individual parts of the designation.

6. What are the basic standard specimens for cement testing (including dimensions)?

7. How is the compressive strength of cement calculated? Provide the equation, describe the individual variables, and their units.

8. How is the flexural strength of cement calculated (the test is a three-point bending test)? Provide the equation, describe the individual variables, and their units.

9. Draw a stress-strain diagram of concrete in compression. Mark and describe all its limits, the elastic region, and state the laws that apply in the diagram.



### **PART C**

1. What material is indicated by the designation B500B? Explain the individual parts of the designation.

2. What is the density value of construction steel?

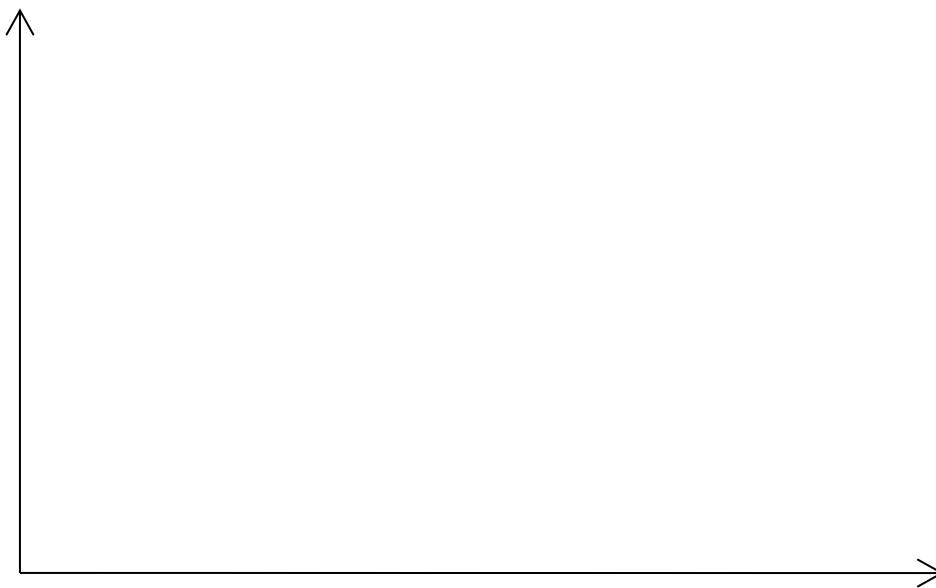
3. What is the modulus of elasticity of construction steel?

4. What is the approximate nominal yield strength of construction steel designated E 10216?

5. How is the tensile strength of steel calculated? Provide the equation, describe the individual variables, and their units.

5. How is the stress at the yield point of steel in tension calculated? Provide the equation, describe the individual variables, and their units.


8. Draw a stress-strain diagram of steel in tension. Mark and describe all its limits, the elastic and plastic regions, and state the law that applies in the elastic region.



## PART D

In the following table, measured values of cube compressive strength of hardened concrete are provided. Calculate the basic statistical characteristics and construct a histogram.

Cube	1	2	3	4	5	6	7	8	9	10
$f_{ci}$ [N/mm <sup>2</sup> ]	30.2	28.1	28.7	29.4	34.2	23.0	32.2	28.1	35.0	27.6

Average value:			
Median:			
Standard deviation:			
Coefficient of variation:			
Histogram:			
Number of classes: <b>3</b>			
Minimum:		Maximum:	
Range (maximum – minimum):		Class length:	
			
Class (class boundary)			
Frequency			

Report prepared by: \_\_\_\_\_