



ASSIGNMENT No 0

Assignment Title: Revision Questions on Reinforced Concrete Structures

Due Date: One Week

Instruction:

- ▶ This assignment is designed to help students revise the basic concepts of Reinforced concrete structures 1.
- ▶ To promote a conceptual discussion among students, this assignment is to be done in group. Each group should have a maximum of 4 members.
- ▶ Use sketches if necessary.
- ▶ The assignment is to be submitted in one week.

1. Why is RC the most commonly used construction material?
2. What is the only material humans use more than RC?
3. List short comings of Concrete?
4. Why is Concrete weak in tension as compared to its compressive strength?
5. What is the importance and use of codes in RC design?
6. Discuss the factors affecting the compressive strength of concrete?
7. Discuss the role of water in producing good concrete?
8. Consider the data on cubic compressive strength of Concrete blocks in MPa.

49.2	53.9	50.0	44.5	42.2	42.3	32.3	31.3	60.9	47.5
43.5	37.9	41.1	57.6	40.2	45.3	51.7	52.3	45.7	53.7
51.0	45.7	45.9	50.0	32.5	67.2	55.1	59.6	48.6	50.3
45.1	46.8	47.4	38.3	41.5	44.0	62.2	62.9	56.3	35.8
38.3	33.5	48.5	47.4	49.6	41.3	55.2	52.1	34.3	31.6
38.2	46.0	47.0	41.2	39.8	48.4	49.2	32.8	47.9	43.3
49.3	54.5	54.1	44.5	46.2	44.4	45.1	41.5	43.4	39.1
39.1	41.6	43.1	43.7	48.8	37.2	33.6	28.7	33.8	37.4
43.5	44.2	53.0	45.1	51.9	50.6	48.5	39.0	47.3	48.8

- a) Use the first 10 observations (first row) and calculate the mean, median, and standard deviation.
- b) Use all 90 data to calculate the mean, median, and standard deviation.

- c) Determine the characteristics compressive strength if the target confidence interval is 5%
 - d) Determine the characteristics compressive strength if the target confidence interval is 50%
9. Why is the cube strength different from the cylindrical strength for the same grade of concrete?
 10. How is the Stress-strain diagram of concrete and steel idealized in ES EN 1992-1-1:2015? Comment why the Stress-Strain diagram of concrete is curved (non-linear)?
 11. Describe the different types of Modulus of Elasticity of Concrete? Which definition is used by ES EN 1992-1-1:2015?
 12. Compare and contrast the different design philosophies in RC?
 13. State the ULS and SLS for beam?
 14. Discuss briefly why we need factor of safety and explain why we use larger factor of safety for concrete as compared to steel?
 15. Discuss type of flexural failure in RC beam?
 16. Discuss the different types of shear failure in RC beams?
 17. Discuss the advantage of concrete cover?
 18. Discuss why we need compression bars in RC beams?
 19. Explain how the presence of an axial load could affect the shear capacity of reinforced concrete beam section?
 20. Explain how an increase in the depth of a beam affects the flexural and shear capacity of the beam section?
 21. How do we guaranty ductile failure in RC beams? (NB: discuss your answer in terms of both flexure and shear)
 22. List at least four different reasons for the formation of cracks in RC members?
 23. Discuss why the ductility of reinforced bar decrease with increase in strength?
 24. How can we control the crack width in RC beams?
 25. Explain how the reinforcement bar on the tension and compression side effects the short term and long-term deflection of RC beams?
 26. For the triangular beam section shown below:
 - a. Calculate the moment in the section for the given strain distribution?
 - b. Find $A_{st,t}$?
 - c. State the failure region?

NB: consider C-30/37 concrete, S-400 steel

