ASSIGNMENT ON CHAPTER ONE

Assignment Title: Introduction to Design of Reinforced Concrete Structures

Due Date: In ONE week

The aim of this assignment is to help students understand the basic concepts and principles of design of reinforced concrete structures.

The assignment is to be done in groups of no more than 7 students per a group.

1. As in any process, the design process of reinforced concrete structures has its own share of uncertainties.
   a) Point out these uncertainties and discuss their implication in the design process?
   b) How does one deal with these uncertainties?

2. Discuss the types of design philosophies implemented in the design of reinforced concrete structures?

3. What do you understand of the terms pre-stressed concrete and reinforced concrete?

4. What do you think is the actual range ultimate strain of reinforcement bar? To aid you with this answer please refer the AAiT material lab results on the tensile capacity of reinforcements. Please discuss the any pattern between the ultimate capacity of the specimens and the ultimate strain.

5. Summarize and discuss your understanding of the following terms.
   - Time dependent volume change of concrete
   - Creep
   - Strength development of concrete after 28 days of casting
   - Durability
   - Characteristic material strength
   - Design material strength
   - Partial factors for material strength
   - Design situation
   - Characteristic loads
   - Design Loads
   - Partial factors for loads
   - Combination factors for variable loads
   - Favorable and unfavorable loading conditions

6. Following the Code requirements, place one of the roof loads combinations on each of the roof beams, which when combined with the primary/leading wind load gives the worst condition for stability of the frame structure shown below.
Assuming the frame system below to be part of a building, answer question # 6.

Pick two of the loads below and apply them across each roof beam.

- $1.35G_r + \psi_0.5Q_r$
- $0.9G_r + \psiQ_r$
- $G_r + \psiQ_r$
- $1.1G_r + \psi_01.5Q_r$
- $0.9G_r$
- $1.1G_r + \psi0Q_r$
- $G_r + 1.5Q_r$

1.5W

Ground Floor

1st Floor

Roof