Semester Project

Assignment Title: Analysis and Design of Building for Gravity Load

Due Date: End of class

For the given architectural drawings assigned to each group, you are expected to carry out the following activities:

I. Understand the given bases.
II. Identify, categories and quantify the loads acting of each level of the building.
III. Idealize the slab system/load transfer mechanism and propose slab and beam dimensions by limiting the span to depth ratio. In doing so explain, why span to depth ratios are opted to be limited.
IV. Design the slab, beam and column for concrete cover considering durability, bond and fire rating requirements.
V. Analyze and design the slab system for both ultimate limit state (ULS) and serviceability Limit State.
VI. Design the stair and transfer the loads to the supporting elements.
VII. Transfer loads from slabs to the supporting beams (If the slab system is supported by beams), and design the beam for both ULS and SLS.
VIII. Model the frame system of the structure on finite element (FE) software, preferably ETABS V16, and carry out a 3D analysis.
IX. By reading on the concept of tributary-area, calculate the load you expect at base of each column of the structural system and compare your result the 3D FE analysis.
X. Design the highly stressed interior, edge and corner columns throughout the building height.
XI. Prepare typical drawings for beam, column and slab according to the detailing requirement of EC-2

Assumptions and considerations:

- Design life of the building is 50 years.
- Material Properties

Material	Designation	Unit weight (kN/m^3)
Concrete (In situ)	C 25/30	25
Steel Reinforcement (≥10mmØ)	S500	25
Steel Reinforcement (<10mmØ)	S400	78.5

- Fire resistance rating for all structural elements is 1 hour.
- Codes of references
  - EN 1990 Eurocode: Basis of Structural Design
  - EN 1991 Eurocode 1: Actions on structures
  - EN 1992 Eurocode 2: Design of concrete structures
- Group and corresponding architectural drawing.

GROUP	ARCHITECTURAL DRAWING
1	Typology A

2	Typology B
3	Typology C
4	Typology D
5	Typology E
6	Typology F
7	Typology G

Instructions

1. Maximum number of students per group shall not exceed **SEVEN**.
2. The project will be evaluated based on the written document and the oral presentation
3. The written document shall be evaluated collectively. i.e. as a group. Whereas the oral presentation shall be evaluated individually.
4. The written document shall be computer typed and drawing shall be done by a computer aided drawing software, preferably AutoCAD.
5. The written document along with the drawings shall be submitted by the indicated submission date.
6. The date for the presentation shall be decided jointly by the Instructor and the students.
7. The presentation shall be conducted in the form of power point. The allotted time for each Group shall be 15 minutes. Each group member shall present his/her part and is encouraged to actively participate in the oral presentation.
8. The order for oral presentation shall be from Group 1 to Group 10. The share of the allotted time for the oral presentation shall be equal between/among the group members.
9. Any group member, except the presenting ones, is allowed to ask questions and/ or give comments on the oral presentation made by others. Each group member shall be asked questions by the Instructor.
10. No time extension is allowed under any circumstances.
11. The written document shall fulfill the standard of project paper at the university level.
12. The document shall be evaluated based on
    - Completion of task
    - Document write up
    - Correctness of procedures
    - Application for further use
13. The presentation will be evaluated based on
    - Time usage
    - Answering questions directed by the instructor
    - Presentation of the work