## Subject Aim:

This subject is intended to:

1. Consolidate the knowledge gained in Structure I and to extend this knowledge to include structural principles as related to design/construction of structural elements in high-rise building. At the end of this subject, the student is expected to be able to design building structural elements and appreciate the design of temporary steelworks.

## Learning Outcomes:

Students will demonstrate their ability to:

1. Recognize load paths in typical multi-storey framed building structures and to compute design loads with due considerations given to a combination of live and dead loads, load and material safety factors.
2. Appreciate the structural principles and their applications to the design of permanent building structures (according to BS 5950 for structural steelwork and BS 8110 for reinforced concrete).
3. Design permanent building structures, including connections in the case of steelwork, with due consideration of overall safety and serviceability requirements.
4. Relate the structural principles and their applications to load and stability analysis of erecting temporary steelworks, in particular cranes of various forms.

## Brief Syllabus Content:

### Design Concept

Limit states design: Ultimate limit states and serviceability limit states, load combination.

**Structural principles applied to the use of reinforced concrete design**

Reinforced concrete design to BS8110: singly and doubly reinforced concrete beams, shear reinforcement, simply supported slabs, one-way continuous slab, compression members under axial load and moment, average and local bond stresses.

**Structural principles applied to the use of structural steel design**

Structural steel design to BS5950. Tension members, beams (laterally restrained and unrestrained), columns, beam-columns, welded and bolted connections.

**Temporary works engineering**

Codes, Standards and Regulations related to the design and erection of temporary steelworks.
**Learning and Teaching Approach** *(tasks and activities designed to achieve learning outcomes):*

**Interactive Lectures** will enable students to:
1. design simple reinforced concrete beams, slabs and columns to BS8110;
2. design simple structural steel beams, columns, beam-columns, welded and bolted connections to BS5950, and
3. appreciate the design and the erection of temporary steelworks.

**Tutorial** will enable students to:
1. consolidate the structural design concept through design problem-solving assignments and discussions.

**Laboratory** will enable students to:
1. identify through a demonstration test the structural behaviour of a full-scale simply supported steel beam subjected to bending.

**Assessment strategy** *(assessment of student performance resulting from learning tasks):*

Assessment comprises of five parts:
1. Problem-solving assignment
2. Laboratory report (Coursework)
3. Design assignment
4. Mid-term test
5. Final examination

To assess students’ ability to design simple reinforced concrete elements and structural steel elements and appreciate the design and the erection of temporary steelworks.

Coursework: 50%
Final Exam.: 50%

**Reading List:**

**Recommended:**

**Supplementary:**
*Structural Use of Concrete - BS 8110: Part 1*, 1997 British Standards Institution.
*Steelwork Design Guide to BS 5950: Parts 1 and 2.*

Construction Sites (Safety) Regulation, Cap. 59.
Factories and Industrial Undertaking Ordinance, Section 6A & 6B – General Duties.
Factories and Industrial Undertaking (lifting Appliance and lifting Gear) Regulation.