Subject Aim:

This subject is intended to:
1. Encourage an appreciation of the structure of buildings.
2. Develop concepts of structural action, leading to an ability to model, analyse and design common elements and structural frames, by understanding simple structural framing.

Learning Outcomes:

Students will demonstrate their ability to:-

1. Use mathematical modelling to explain the behaviour of building materials and structures.
2. Apply the concepts of structural mechanics to solve structural problems involving beams, columns and statically determinate frames.
3. Quantify and analyse the internal and external forces (i.e. internal moments/stresses and external loads) acting within and upon a structural component under various anticipated loading conditions.
4. Design simple structural elements to withstand these forces in their respective loading conditions.

Brief Syllabus Content:

Identification of forces and their effects on structures: Point and distributed static loading, (quasi-static) wind loading, load transfer in common building structures of various forms.

Reaction of structural materials to imposed loads (with induced stresses and deformation).

Statically determinate truss: Computation of internal forces using the Method of Joints and Method of Section.

Stresses: The induced stresses as a permutative combination of tension, compression, flexural bending moment and shear.

Beams: Simple flexural theory, computation of bending stresses, shearing force and bending moment distribution, deformation and deflection of beams, sizing of simple steel beams to current codes.

Columns and walls: Simple buckling theory of columns, effective length and slenderness ratio in relation to fixity conditions, combined stresses as subjected to eccentric axial load, sizing of steel columns to current British Standard.
**Learning and Teaching Approach** (tasks and activities designed to achieve learning outcomes):

**Interactive Lectures** will enable students to:
1. analyse the internal forces of truss members, beams and columns;
2. analyse the strength of the materials for axial, bending and shear loadings.
3. apply the structural concept to design simple beams, columns and connections.

**Tutorial** will enable students to:
1. consolidate the structural mechanics and analysis concepts through problem-solving assignments and discussions.

**Laboratory** will enable students to:
1. identify the structural behaviour of simple truss, beams, and columns.

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

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

to assess students in the ability to identify and appreciate basic concept of structural mechanics to model, analyse and design simple structural elements.

Coursework: 30%
Final Exam.: 70%

**Reading List:**

**Recommended:**


**Supplementary:**


*Structural Use of Concrete - BS 8110: Part 1*, 1997 British Standards Institution

*Structural Use of Steelwork in Building - BS 5950: Part 1*, 2000 British Standard Institution

*Steelwork Design Guide to BS 5950: Parts 1 and 2*
