

Objective

To introduce the concepts of behavior of structural components and simple analytical techniques. The course aims at covering basic theorems and mechanical properties of engineering materials, elastic constants, different types of stresses and strains, the deformation of elastic bodies under simple stresses, the use and principles of composite sections, geometrical properties such as centroid, moment of inertia etc of sections for different shapes, analysis of perfect frames for vertical loads by analytical as well as graphical methods.

Module 1**BRIEF INTRODUCTION OF HISTORY OF STRUCTURAL DESIGN**

Trabeated construction, vaults, flying buttresses, tents, masted structures & bridges through ancient & medieval history, Post Industrial modular construction of large span & suspension structures in steel and concrete- examples of iconic projects.

Principle of statics, forces, resolution of forces, co-planar, non-coplanar, concurrent, non concurrent, Equilibrium of concurrent forces in a plane, Triangle of forces, parallelogram of forces.

Module 2**TRUSSES AND FRAMES**

Plane trusses. Method of joints, Virtual works, Equilibrium of Ideal system, stable and unstable equilibrium. Examples related to building and other structure.

Module 3**FORCES AND GEOMETRICAL PROPERTIES OF SECTIONS**

Center of gravity, Center of parallel forces in a plane, Center of gravity, Centroids of curves, Distribution of forces in a plane.

Moment of inertia of plane figure with respect to an axis in its plane, with respect to perpendicular to the plane, parallel axis theorem, product of Inertia.

Module 4**PROPERTIES OF MATERIAL**

Concept of stress strain normal stress, shear stress, normal strain, shear strain, Hooks law, Poissons ratio, principal stresses, Principal strain, Mohar's circle for stress and strain. Breaking stress, factor of safety, safe stress values for materials.

Module 5

Application of concepts with practical examples.

References

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