SUBJECT NAME – STRUCTURE I

SUBJECT CODE – 3326205

FOCUS:

To give an introduction to the basic principles governing structural systems. Concept of direct force mechanism in structures, concept of resultant force, tension and compression. Equilibrium of forces, concept of structure and tie.

CONTENT:

- Introduction:
    - Introduction Fundamental principles of Engineering Mechanics, Newton's laws of motion, law of parallelogram of forces, principle of transmissibility, concept of rigid body, particle.
- Natural forms :
    - Understanding Nature- a creative base for understanding structure, correlation between natural & manmade structure.
- Forces :
    - Introduction to types of forces, Static loading, Time dependent loading, Impact loading, Cause & effect of various forces like Dead load, Imposed load, Wind load, Earthquake load, Hydrostatic load, erection force etc on building. Effect of physical form on load transfer i.e. Forces acting through point, distributed forces on line, & area.
- Force systems :
    - Free body diagram, Resolution of forces into components, Types of force systems, concurrent, coplanar, non concurrent etc. forces in plane & space.
    - Calculation of resultant for coplanar parallel & coplanar concurrent force system, calculation of moment.
- Equilibrium:
    - Introduction to Equilibrium, Conditions of equilibrium for the coplanar parallel & coplanar concurrent force system, Types of supports, Determinacy, &
    - Stability, Basic behavior of elements in load transfer i.e. bending, torsion, shear, tension, compression etc.
- Tension and Compression
    - Introduction as a flexural element, simply supported, overhanging & cantilever beams, determinacy, calculation of Reaction at supports for beam, Application.
    - Introduction, Types of truss, Analysis of a plane truss. Use of graphical method.
    - Introduction to space truss, Application.
- Simple Stresses and Strains – Concept of Deformable Bodies, Types of Stress (compressive, tensile, bending, shear) and strain (axial, shear, volumetric). Simple problems.
- Bending Moment and Shear Force Diagrams – Concept of Shear force and bending moment. BMD and SFD for statically determinate beams subjected to combinations of concentrated and uniformly distributed load.
- Relationship among Load, Shear force and Bending Moment.

SUGGESTED BOOKS

- Vector mechanics for engineers- statics by Bear & Johnston
- Engineering Mechanics, statics & Dynamics by Desai & Mistry
- Applied Mechanics by Junarkar & H.J. Shah
- Seeking structure from nature by Jeffery Cook
- Strength of Material – RK Bansal, Laxmi Publications, New Delhi, Third Edition
- Application Mechanics and Strength of Materials by IB Prasad