SEMESTER III

THEORY

| AS313 | Structural Analysis | HRS 3-0-0 | CR-3 |

Objective
With the acquired knowledge of statically equilibrium of forces the course aims at teaching methods to determine effect of loads on members of different determinate structures and give additional knowledge of deformation of structures to solve indeterminate structures.To familiarize the student with the effects of transverse forces such as shear force& bending moment in beams; determination of SF & BM in simple beams under different loading systems; and understanding of strength and forces in columns and arches

Module 1
Introduction to determinate and in determinate structures, Different types of loads acting on a structure
BEAMS: TYPES & PROPERTIES
Types of beams, its behaviour, types of supports and reactions, bending moment and shear forces; simply supported, cantilever and overhanging beams, relation between bending moment and shear force.
Explaining with Bending moment and Shear force diagram.

Module 2
BENDING AND SHEAR FORCES
Shear fore and bending moment for fixed and continuous beams, application of Clapperayon s theorem of three moments. Moment distribution method.
Determination of member of forces in determinate trusses and simple frames.

Module 3
DEFLECTION
Relation between slope, deflection and curvature, double integration method, three moment theorem, deflection by conjugate beam method.
Application to simple cases including overhanging beams.

Module 4
COLUMNS
Types of columns, columns and struts, buckling and crushing failure, Euler s theory, equivalent length and slenderness ratio, Rankine s formula.

Module 5
ARCHES
Determination of horizontal thrust, radial shear and normal force, axial thrust, bending moment and shear force for three-hinged arch. Structural concepts in post & lintel, arch, dome, and vault construction.
References
1. Junnarkar, S. B. (1991). Mechanics of Structures. Vol. 1. 20th Ed. Delhi : Charotar.
2. Kurmi, R. S. Strength of Materials. New Delhi : S. Chand & Company.
3. Mukherjee, S. Elements of Engineering Mechanics. New Delhi : PHI Learning.

4. Ramamrutham, S. (2008). Engineering Mechanics: A Textbook of Applied Mechanics. Dhanpat Rai Publishing.
5. Vazirani and Ratwani. (2008). Analysis of Structures. Vol. I. New Delhi : Khanna Publishers.
6. Gere, J. M & Timoshenko, S. P. , Mechanics of Materials , CBS Publishers & Distributors.