

# **AMEV-12 BASIC STRUCTURAL ANALYSIS**

## **OBJECTIVES:**

To learn the modern method of analysis of beams and frames.

## **UNIT I ENERGY PRINCIPLES**

Strain energy and strain energy density - strain energy due to axial load, shear, flexure and torsion - Castigliano's theorems - principle of virtual work - application of energy theorems for computing deflections in beams and trusses - Maxwell's reciprocal theorems

## **UNIT II DEFLECTION OF DETERMINATE STRUCTURES**

Principles of virtual work for deflections - Deflections of pin-jointed plane frames and rigid plane frames - Williot's diagram.

## **UNIT III SLOPE DEFLECTION METHOD**

Slope deflection equations- Analysis of continuous beams and rigid frames - Support settlements.

## **UNIT IV MOMENT DISTRIBUTION METHOD**

Stiffness and carry over factors - Distribution and carry over of moments - Analysis of continuous Beams - Plane rigid frames with and without sway - Support settlement.

## **UNIT V COLUMNS AND CYLINDER**

Euler's theory of long columns - critical loads for prismatic columns with different end conditions; Rankine-Gordon formula for eccentrically loaded columns - Eccentrically loaded short columns - middle third rule - core section - Thick cylinders - Compound cylinders

## **OUTCOMES:**

The students completing the course will have

- an insight into the stress strain energy principles, slope deflection method and moment distribution method

- ability to model loads on structures and analyse structural elements including beams, columns and cylinders

- ability to determine deflections of beams and frames using classical methods

## **TEXT BOOKS:**

Bhavikatti, S.S, "Structural Analysis", Vol.1 and 2, Vikas Publishing House Pvt. Ltd., New Delhi, 2003.

Punmia, B.C, Ashok Kumar Jain & Arun Kumar Jain, " Theory of structures", Laxmi Publications, New Delhi, 1---.

Hibbeler, R.C., "Structural Analysis", 7<sup>th</sup> Edition, Prentice Hall, 2008.

## **REFERENCES:**

William Weaver, Jr & James M.Gere, "Matrix analysis of framed structures", CBS Publishers & Distributors, Delhi, 1--5

Vaidyanathan,R & Perumal P, "Structural Analysis, Vol.1 & 2", Laxmi Publications, New Delhi, 2004  
Ashok K.Jain, "Advanced Structural Analysis", Nem Chand & Sons, 1--6  
Pandit G.S. and Gupta S.P., "Structural Analysis - A Matrix Approach", Tata McGraw Hill Publishing Company Ltd., 2006  
Reddy .C.S, "Basic Structural Analysis", Tata McGraw Hill Publishing Company, 2005.