

## (CE515) MATRIX METHODS OF STRUCTURAL ANALYSIS

### **Objective of the Course:**

The main objective is to expand the student knowledge of the stiffness and flexibility methods studied in the basic structural analysis courses. This course is also expected to enable a good understanding of how standard software packages and students will be able to implement the method developing their own computer program to analyze structures.

### **UNIT-I**

#### **Generalized Measurements**

Degrees of freedom - Constrained Measurements - Behaviour of structures – Principle of superposition- Stiffness and flexibility matrices in single, two and n-co-ordinates - Structures with constrained measurements.

### **UNIT-II**

#### **Stiffness and flexibility matrices from strain energy**

Betti's law and its applications- Determinate and indeterminate structures - Transformation of element matrices to system matrices - Transformation of system vectors to element vectors.

### **UNIT-III**

#### **Flexibility method**

Application to statically determinate and indeterminate structures – Choice of redundant - Transformation of redundant-Internal forces due to thermal expansion and lack of fit.

### **UNIT-IV**

#### **Displacement method**

Internal forces due to thermal expansion and lack of fit - Application to symmetrical structures - Comparison between stiffness and flexibility methods.

### **UNIT-V**

#### **Matrix Substructuring**

Tridiagonalization- Analysis by Iteration method - frames with prismatic members – nonprismatic members.

### **TEXT BOOKS:**

1. Kanchi, Matrix Structural Analysis, Wiley Eastern Ltd., Newdelhi 1981.
2. Rajasekaran S, Computational Structural Mechanics, Prentice Hall of India. New Delhi, 2001.

### **REFERENCE BOOKS:**

1. Matrix Analysis of Framed Structures by W. Weaver & J.M.Gere, CBS Publishers,1986.
2. Computational structural mechanics by S.Rajasekharan and Sankarasubramanian, Prentice Hall of India , 2001.