ST5004 MATRIX METHODS FOR STRUCTURAL ANALYSIS

DETAILED SYLLABUS

OBJECTIVES

To study the concepts, characteristics and transformation of structures using matrix approach

UNIT I ENERGY CONCEPTS IN STRUCTURES

Introduction – Strain Energy – Symmetry of The Stiffness And Flexibility Matrices – Strain Energy in Terms of Stiffness And Flexibility Matrices – Stiffness And Flexibility Coefficients in Terms of Strain Energy – Additional properties of [a] and [k] – another Interpretation of coefficients aij and kij – Betti's law – Applications of Betti's law: Forces not at the coordinates – Strain energy in systems and in Elements.

UNIT II CHARACTERSTICS OF STRUCTURES – STIFFNESS AND FLEXIBILITY

Introduction – Structure with Single Coordinate- Two Coordinates-Flexibility and Stiffness Matrices in Coordinates- Examples-Symmetric Nature of Matrices- Stiffness and Flexibility Matrices in Constrained Measurements- Stiffness and Flexibility of Systems and Elements-Computing Displacements and Forces form Virtual Work-Computing Stiffness and Flexibility Coefficients.

UNIT III TRANSFORMATION OF INFORMATION IN STRUTURES

Determinate- Indeterminate Structures-Transformation of System Forces to Element Forces-Element Flexibility to System Flexibility - System Displacement to Element Displacement-Element Stiffness to System Stiffness-Transformation of Forces and Displacements in General –Stiffness and Flexibility in General –Normal Coordinates and Orthogonal Transformation-Principle of Contregradience

UNIT IV THE FLEXIBILITY METHOD

Statically Determinate Structures –Indeterminate Structures-Choice of Redundant Leading to and Well Conditioned Matrices-Transformation to One Set of Redundant to Another-Internal Forces due to Thermal Expansion and Lack of Fit-Reducing the Size of Flexibility Matrix-Application to Pin-Jointed Plane Truss-Continuous Beams-Frames-Grids.

Diploma, Anna University-UG, PG., HSC & SSLC

Notes   *Available @*
Syllabus
Question Papers   www.AllAbtEngg.com
Results and Many more…

UNIT V THE STIFFNESS METHOD

Introduction-Development of Stiffness Method- Stiffness Matrix for Structures with zero Force at some Coordinates-Analogy between Flexibility and Stiffness-Lack of Fit-Stiffness Matrix with Rigid Motions-Application of Stiffness Approach to Pin Jointed Plane Trusses-Continuous Beams- Frames-Grids-Space Trusses and Frames-Introduction Only-Static Condensation Technique- Choice of Method-Stiffness or Flexibility.

REFERENCES

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2. Devdas Menon., "Advanced Structural Analysis", Narosa Publishing House, New Delhi, 2009

3. Pandit G.S. and Gupta S.P., "Structural Analysis-A Matrix Approach", Tata McGraw-Hill Publishing Company Limited, New Delhi, 1997.

4. Moshe F. Rubinstein – Matrix Computer Analysis of Structures- Prentice Hall,1969

5. Reddy C.S., "Basic Structural Analysis", Tata McGraw-Hill Publishing Company Limited, New Delhi, 1997