

## NPTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

NPTEL Video Course - Mechanical Engineering - NOC:Basics of Finite Element Analysis

Subject Co-ordinator - Prof. Nachiketa Tiwari

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Finite Element Analysis(FEA)  
Lecture 2 - Introduction of FEA, Nodes, Elements and Shape Functions  
Lecture 3 - Nodes, Elements and Shape Functions  
Lecture 4 - Polynomials as Shape Functions, Weighted Residuals, Elements and Assembly Level Equations  
Lecture 5 - Types of Errors in FEA, Overall FEA Process and Convergence  
Lecture 6 - Strengths of FE Method, Continuity conditions at Interfaces  
Lecture 7 - Key concepts and terminologies  
Lecture 8 - Weighted integral statements  
Lecture 9 - Integration by parts - Review  
Lecture 10 - Gradient and Divergence Theorems-Part - I  
Lecture 11 - Gradient and Divergence Theorems Part - II  
Lecture 12 - Functionals  
Lecture 13 - Variational Operator  
Lecture 14 - Weighted Integral and Weak Formulation  
Lecture 15 - Weak Formulation  
Lecture 16 - Weak Formulation and Weighted Integral  
Lecture 17 - Variational Methods  
Lecture 18 - Rayleigh Ritz Method  
Lecture 19 - Method of Weighted Residuals  
Lecture 20 - Different types of Weighted Residual Methods - Part I  
Lecture 21 - Different types of Weighted Residual Methods - Part II  
Lecture 22 - FEA formulation for 2nd order BVP - Part I  
Lecture 23 - FEA formulation for 2nd order BVP - Part II  
Lecture 24 - Element Level Equations  
Lecture 25 - 2nd Order Boundary Value Problem  
Lecture 26 - Assembly of element equations  
Lecture 27 - Assembly of element equations and implementation of boundary conditions  
Lecture 28 - Assembly process and the connectivity matrix  
Lecture 29 - Radially Symmetric Problems

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## NPTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

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- Lecture 30 - One dimensional heat transfer
- Lecture 31 - 1D-Heat conduction with convective effects
- Lecture 32 - Euler-Bernoulli beam
- Lecture 33 - Interpolation functions for Euler-Bernoulli beam
- Lecture 34 - Finite element equations for Euler-Bernoulli beam
- Lecture 35 - Assembly equations for Euler-Bernoulli beam
- Lecture 36 - Boundary conditions for Euler-Bernoulli beam
- Lecture 37 - Shear deformable beams
- Lecture 38 - Finite element formulation for shear deformable beams
- Lecture 39 - Finite element formulation for shear deformable beams
- Lecture 40 - Equal interpolation but reduced integration element
- Lecture 41 - Eigenvalue problems
- Lecture 42 - Eigenvalue problems
- Lecture 43 - Introduction to time dependent problems
- Lecture 44 - Spatial approximation
- Lecture 45 - Temporal approximation for parabolic problems
- Lecture 46 - Temporal approximation for parabolic problems
- Lecture 47 - Temporal approximation for hyperbolic problems
- Lecture 48 - Explicit and implicit method, diagonalization of mass matrix, closure