Course Title:	Course Code:	Credit Hrs:
Introduction to Finite Element Analysis	ME-411	2+1

Textbooks:

- Richard G.Budynass, Advanced Strength and Applied Stress Analysis,McGrawHill

Reference Books:

- Saeed Moaveni,Finite Element Analysis – Theory and Applications with ANSYS , Prentice Hall 3. M J Fagan ,Finite Element Analysis – Theory and Practice ,Pearson Publications

Course Objective:

Finite Element Analysis (FEA) involves using numerical methods to approximate solutions for complex engineering problems, allowing detailed analysis of stress, deformation, and thermal effects in structures and components.

Course Outline:

- Introduction to FEA and Element Performance: Introduction to Finite Element Modeling and preliminary decisions, Element types and their properties, Basic concepts of equilibrium & compatibility, General factors affecting element performance – Sources of errors & Convergence.
- FE Methods, Shape Functions, Stiffness Matrix, and Transformation: Direct Stiffness Method, Energy Methods, Shape Function: Linear and Quadratic Element, Beam Elements, Truss Elements, Linear and Planar elements & Stiffness matrix, Local to Global Co-ordinate Transformation Assembly
- Static Structural Analysis: Modeling and analysis of 1D, 2D and 3D structures under static loading
- Heat Transfer and Thermal Stress Analysis: Introduction to Heat transfer, Thermal and Thermal Stress analysis concepts, Selection of Boundary Conditions based on the identification of problem, Thermal Analysis (Steady State) & Thermal stress Analysis.
- Dynamic Analysis: Introduction to different types of dynamic analysis, Modal Analysis, Frequency Response Analysis, Transient Response Analysis, master's degrees of Freedom.

Description	Percentage Weightage (%)
Assignments	05-10%
Quizzes	10-15%
Mid Semester Exams	30-40%
End Semester **ASSESSMENTS** Exam	40-50%